REPORT

ON THE

EPIDEMIC CHOLERA

AS IT HAS APPEARED IN THE TERRITORIES SUBJECT TO

THE PRESIDENCY OF FORT ST GEORGE.

26/11

DRAWN UP BY ORDER OF GOVERNMENT,
UNDER THE SUPERINTENDENCE OF THE MEDICAL BOARD,

BY

WILLIAM SCOT,

SURGEON AND SECRETARY TO THE BOARD.

BIBLIOTH. COLL. REG. MED. EDIN.

ABRIDGED FROM THE ORIGINAL REPORT PRINTED AT MADRAS IN 1824.
WITH INTRODUCTORY REMARKS, BY THE AUTHOR.

WILLIAM BLACKWOOD AND SONS, EDINBURGH;
AND
JOHN MURRAY, LONDON.
MDCCCXLIX.

PRINTED BY WILLIAM BLACKWOOD AND SONS, EDINBURGH.

W. & A. K. Johnston Edinr.

TO THE

CHAIRMAN, DEPUTY-CHAIRMAN,

AND

COURT OF DIRECTORS OF THE EAST INDIA COMPANY,

THIS ABRIDGED EDITION

OF

THE MADRAS REPORT ON CHOLERA

IS, BY PERMISSION, RESPECTFULLY DEDICATED,

BY THEIR FAITHFUL, HUMBLE SERVANT,

THE AUTHOR.

INTRODUCTORY REMARKS.

The Madras Report on Cholera was printed by order of the government of that presidency in 1824. The greater part of the edition was reserved for India, and only a limited number of copies transmitted to the India House for distribution in this country. It was the last published of the official reports, and was written with the advantage of a more extended experience of the disease; but this had not led to any decided or authoritative opinions regarding its nature, nor to any knowledge of a mode of treatment which could be relied upon as successful: all was uncertain.

The object of the report, therefore, was neither to pronounce opinions, nor to lay down rules, but simply to convey a clear and impartial summary of the observations and practice in cholera, as these were exhibited in the official communications of medical officers to their superiors; accompanying it with a very large mass of these original papers, in order that all might judge for themselves. At that period, it was considered to be of importance, in any inquiry into the nature of cholera, that there should be ample statistical information, both in respect to the state of health of the army, and to the phenomena of the weather for some time preceding the appearance of cholera and afterwards; and this was supplied by a voluminous series of sick returns and meteorological tables, extending from

1815 to 1821, got up with great labour and research. The publication of these original reports, and these tables and returns, unfortunately swelled the Madras report to the inconvenient size of a folio volume of 550 pages, rendering it altogether inaccessible to the medical profession in Britain, and only imperfectly known to them through the medium of those reviews which noticed it at the time of its publication. When cholera afterwards found its way to Europe, and afforded to every man the means of forming his own opinion, and drawing his own conclusions respecting it, hopes were entertained that the researches of so great a body of able and scientific men as Britain possessed, would lead to a more perfect knowledge of a disease which had too much baffled the efforts of their brethren in India. Unfortunately, that visitation passed away without much being achieved; and now a second has come upon us, and found the medical profession, and the public generally, as little prepared to meet and stay its ravages as on the first. The mortality from cholera continues to be as great, opinions even more unsettled, rules of practice as undefined, men's minds as much adrift as ever: under these circumstances, it has been considered, that it would be an acceptable service to the profession to republish, in a convenient and accessible form, a Report possessing that fulness of information, and that stamp of authority, which it must eminently possess, as being exclusively drawn from an immense mass of authentic and official records, and totally free from all personal bias or preconceived theory of the writer. It may not now, indeed, afford any information that can be called new; neither can there be said to be much of new matter brought forward in this country: almost all that is now known will be found, it is believed, in that Report, and it may serve at

least as an authentic basis on which to commence those researches into the nature and treatment of this formidable disease, which it must still be the object of all inquiring men to set seriously about.

Accordingly, the original "Report," founded on the communications of medical officers, all actively engaged in the treatment of cholera as it then appeared, and a "Narrative" drawn from the same sources, of its first appearance in and progress though the Madras territories—and strikingly illustrative of its march there, as well as its progress at subsequent periods in Europe—are now presented to the public in a single and portable volume, and without any alteration from the original text. It thus faithfully represents the state of our knowledge at that period, and nothing more. It would doubtless have been desirable to offer, at the same time, a reprint of the most valuable of the original reports of the medical officers; but as this would have swelled the work to a second volume, it has been considered more advisable to limit it to its present form.

Having been engaged, however, in the active discharge of my professional duties in India, for a number of years after the date of the Report, it may be expected that I should now state such further observations in the nature and treatment of cholera as have occurred to me during that interval, or even subsequently. But though various opinions, and many ingenious theories on the subject, have been promulgated, both in India and in Europe, it may be said that none of these have satisfied the public mind. There exists now the same doubt, the same uncertainty, the same indecision as existed then; and the great body of professional men have either continued, or have reverted to, very much the same general mode of treatment that was adopted during the first few years of the prevalence of

cholera in India. I shall therefore content myself with adverting, very shortly, to some of the principal points of practice mentioned in the Report, and conclude with some general remarks on the disease.

And first, with respect to the important subject of blood-letting in cholera, it must be admitted that the practice, as *originally inculcated*, has not been sustained by the results of further experience. In an early stage of the disease, when there is much spasm, or oppression in breathing, or violent disorder of the stomach and bowels, or other inordinate actions, bleeding is still upheld as a powerful and needful remedy. But the advocates for bleeding went farther, and vehemently urged it, not only as preventing, but as removing collapse; on the principle, that the volume of the blood being lessened, the heart would be enabled, mechanically as it were, to preserve, or resume its functions with increased vigour. In this view, the state of collapse, however far advanced, offered additional ground for the practice, the only difficulty being to obtain the required quantity of blood. It is that part of the practice of blood-letting which appears to have been gradually abandoned in India; and there can be no doubt that, in numerous cases of collapse, when blood could be obtained in any desired quantity, the result has not only not been generally favourable, but, on the contrary, too often the reverse. The employment of bloodletting in cholera is now conducted on general principles, and, used with judgment, it fully upholds its reputation.

The indiscriminate, and we may say inordinate use of calomel, which at first obtained in the treatment of cholera in India, led in the sequel to some degree of prejudice against it. Though it may not be directly curative of choleric action, it must still be acknowledged to be a

medicine of much efficacy in disordered states of the mucous membrane of the stomach and bowels; and, whether that membrane be the original seat of cholera or not, it is at least admitted to be, in all cases, more or less sensibly affected. The use of calomel accordingly, which was never at any time altogether abandoned, continues to be resorted to by most practitioners with unabated confidence, although now commonly prescribed in more moderate quantities than at first; and, whether immediately useful or not, it is held to have important effects in conducting the patient through the after stages of the disease—a consideration of particular consequence in this country, where secondary or consecutive fever is of much more frequent occurrence than in India, and in which the action of calomel might be useful.

Much diversity of opinion has been entertained, both in India and in Europe, regarding the use of opium in cholera. Like calomel, it was probably often much misused; for its properties at once naturally pointed it out as the most appropriate remedy for the first and most striking features of the disease. Either directly condemned, or very cautiously and reluctantly admitted by many, both in India and Europe, opium still stands its ground, with the great body of the profession, as a remedy that we cannot dispense with; and it is, in fact, as much employed in India now as heretofore, though administered more judiciously in regard to quantity, and to the periods for its exhibition.

Nearly the same observations are applicable to stimulants as to opium. In spite of all the objections urged against their use in cholera, stimulants are yet approved of by the great body of practitioners; and what is termed the stimulating plan of cure is still generally adopted, though with the same discriminative caution that has been

noticed in regard to bloodletting, calomel, and opium. It seems unnecessary to pursue this part of the subject farther: it is manifest that, after the lapse of about thirty years, no material change has been made in the treatment of cholera. Not that new remedies, and new plans of treatment, have not been abundantly proposed—many of them of the most opposite nature—but that, after trial, almost all have been abandoned; and we now find professional men constantly and silently recurring to the old routine, if we may so designate it. But the most surprising, the most melancholy, and the most mortifying thing of all is, that, under every method of treatment hitherto pursued, in any quarter of the world, the average rate of mortality of cholera continues much the same—certainly not diminished, perhaps rather augmented. We possess no means of judging correctly of the relative mortality from cholera, as it may be affected by climate. To attain that object, we should have returns of the cases of cholera occurring amongst the natives of India of all classes, in several districts, towns, or villages, to contrast with similar returns in Europe. The chief difficulty, however, in India, would be the incorrectness of such returns, not much dependence being placed on the judgment or fidelity of the native doctors, or the native revenue servants, usually employed on that duty. The only return of this description which seems entitled to consideration, relates to an extensive district to the northward of Madras. It exhibits an aggregate of 14,723 cases, yielding 4345 deaths, scarcely 30 per cent. In some villages, the mortality rose to 89 in 100, 10 in 13, 48 in 70, 99 in 143, when there was either no medical aid, or when it was refused. In the principal town, where the European medical officer resided, and where classification would be more correct, the rate was 40

per cent. The returns in this country, at present published by the Board of Health, are generally said to be incorrect, and not to exhibit the numbers actually seized with cholera. If, however, they give a true account of the events of the cases entered, it is sufficient for our present purpose. Now, up to 22d February these returns give 12,621 cases, 5595 deaths, 3840 recoveries, and 3186 remainders, which exhibits a ratio of mortality of only 44 per cent.; but, taking this per-centage of 44 out of the remainders, 3186, it yields 1400 to be added to the deaths, and the real rate of mortality will be found to be at least 55 per cent.

It would scarcely be fair to contrast the mortality exhibited in the returns of sick in military hospitals, with civil returns; because, in the former case, we have to deal only with men of adult age, most of them in the prime of life, enjoying all the advantages of immediate cognizance, and of a regular hospital; whereas, in returns of civil life, we have all ages, sexes, and classes included—loss of time and imperfect means of treatment with the poorer ranks, and so forth. In the Madras Report in 1824, the mortality amongst the European troops is stated at about 19 per cent, and amongst the native troops at 25, in the whole number of cases of cholera treated in hospital during the first six or seven years of the prevalence of the disease; while, in marked instances of epidemic attacks, the mortality amounted to 27 per cent in the European, and 38 in the native ranks. Latterly, however, whether under more careful diagnosis, or from circumstances we are not acquainted with, the rate of mortality in the Madras army appears to have greatly increased. From tables very carefully prepared by Assistant-surgeon Lorimer, published by the government, extending from 1834 to 1838, the mortality from cholera, amongst the European troops in garrison and the field, stood at 27 per cent, being

an increase of 8; and amongst the native troops it amounted to not less than 45 per cent, being an increase of 20. Again, by a table published by Mr Rogers, of the same service, the mortality in Her Majesty's troops in that presidency, from 1826 to 1843, had reached to 42 per cent.

The rate of mortality in Europe appears to be very materially increased by the tendency to secondary or consecutive fever, which was not of very frequent occurrence in India. Still, in that climate, cholera was pretty often followed by fever, more of a typhoid type than usually occurs there, and still more frequently by affections of the head and the abdominal viscera, greatly complicating the treatment, especially amongst the Europeans.

Cholera is unquestionably a most appalling disease, but its attacks are fortunately fitful and irregular, and it thus occasions less mischief than the more gradual but unceasing diseases of the abdominal viscera. In an effective strength of about 10,000 European troops, on an average of 11 years, cholera only produced an annual mortality of 74 men; while diseases of the abdominal viscera, hepatitis, dysentery, and diarrhœa, produced a mortality of 222 men, exclusive of a number rendered unfit for service.

With respect to the appearances found on dissection, in India, it is stated in the Report that they had not thrown any light on the proximate cause of cholera. Subsequently to that period, dissections have been more carefully and minutely made, and greater attention directed to the state of the spinal cord and nerves—while in Europe anatomists of the highest reputation have been similarly engaged; but still no certain and invariable results have been obtained. Theories have, nevertheless, been founded on an inflamed condition of the spinal cord, and of the ganglionic system of nerves; but unless such conditions are proved to be invari-

able, if they are proved to be absent in a single case, the theory can scarcely be maintained. The extreme suddenness of development which characterises this disease, the facility with which it can often be arrested at a certain stage, the nature of the remedies most successfully employed, and the absence in general of inflammatory symptoms, would all seem to stamp cholera as a purely functional disease. If the ganglionic system of nerves form the primary seat of the disease, as seems extremely probable, it must be through the medium of a specific poison acting upon them functionally. There seems reason to believe, however, that those appearances on dissection which have been assumed to be inflammatory, are frequently confounded with that of congestion. Again, the term "congestion" has in itself led to misconception, as applied to cholera; for it would appear to have been chiefly used in the sense of a passive accumulation or retention of the blood in some particular organ; but this can scarcely be correct, for, in the struggles of the heart to propel the blood which has receded from the surface towards the centre, it may be driven forcibly into such of the internal organs, and especially the more delicate tissues as are least capable of resistance; and not to internal organs only, but to external also, as I had once, and only once, an opportunity of witnessing, in a fatal case which I was watching with intense anxiety. While looking earnestly into the countenance of the patient, I saw the vessels of the conjunctiva deeply injected with blood in a moment of time. I was able distinctly to trace its progress; it was arterial blood, propelled in a jet from the back part of the globe of the eye, forwards to the verge of the cornea, presenting that appearance sufficiently known in cholera, and which has led the natives of India to denominate it as the "red eye sickness." Others may have

observed the same process, but I have never seen it noted. Now a similar injection of blood into the theca vertebralis, or into some part of the ganglionic system of nerves, would present an appearance of active inflammation—and so, perhaps, it might be styled—but it does not form that species of inflammation on which a theory of the disease could be founded.

The doctrine that cholera depended on "*a diminished energy of the nervous system, but especially of that part of it which supports the vital and natural functions,*" was laid down in the Madras Report, (page 176 of the present edition,) and yet we find it claimed as a discovery in this country. The term cholera asphyxia, was also first given to the disease in the Madras Report, a term which appears now to be very generally adopted.

Perhaps the most singular and unaccountable circumstance relating to cholera asphyxia, has been its total abeyance in India, at least as an epidemic, from 1787 to 1817, a period of thirty years—an abeyance so complete that it came on the then existing generation as a new thing! But we are told in Scripture, "The thing that hath been, is that which shall be; and that which is done, is that which shall be done; and there is no new thing under the sun." Cholera would appear to be essentially a disease of a warm climate. *There* it seems to have originated, and *there* it has continued, in all probability, from the remotest time. We have now seen it established, continuously, for more than thirty years, in the Indian territories, and it may be said, with too much truth, to have now assumed an endemic character. Why it does not prevail in all hot climates, we cannot tell: nor whether, indeed, it is known in the warm regions of Africa. A disease much resembling it exists as an endemic in South

America—the "vomito prieto," which prevails chiefly at the hottest season of the year.

However cholera may have been originally a disease of a warm climate, it is unfortunately not now confined to these limits; but, under certain influences, which we do not understand, it occasionally oversteps its natural boundaries, and penetrates to the remotest quarters, equally of the temperate as of the coldest regions—preserving with undeviating constancy all its peculiar features, and all its customary mortality. Thus have we twice, in the short space of sixteen or seventeen years, seen it sweep over Europe, and penetrate to America; and though we may have good grounds for hope, that it will never be established as an endemic in the temperate or colder climates, we can scarcely expect that, at intervals more or less distant, it will not return as an epidemic. Many things conspire to render that event more probable now than formerly. Whatever may be the case, in respect to its capability of communication from man to man individually, there is undoubted evidence that bodies of men, travelling through a country in which cholera prevails, have the disease imparted to them—that they carry the disease along with them, and do at times impart it to the inhabitants of the country which they are traversing. The rapid and intimate intercourse established, in the present day, between all parts of the world, must enhance the danger of *imported* disease; and though it is true that hitherto we have no information that cholera has been communicated directly from India to Europe by steam conveyance, its transmission across the Atlantic from Europe to America shows, at least, that such a thing is possible. The vast extent and consolidation of our Indian empire—the consequent perpetual movements of troops, with their numerous followers

—the more frequent intercourse with countries situated to the westward of our immediate possessions, whether by armies or by caravans, or by pilgrims bound for Mecca, who annually resort thither in great numbers—all tend to perpetuate and to spread the disease. Cholera, in all cases, advances by stages: its progress is not rapid and wide-spreading, as if it were impelled or conveyed by atmospheric currents, but slow and gradual: its march, on the whole, is regular, both geographically and chronologically, notwithstanding the somewhat fanciful descriptions we have had of its fitful, wayward, and erratic course. It has been in this slow and steady manner that it has twice travelled through Persia to Europe, and so it will be again. Once on its onward course, no power can stay it.

The interest, therefore, of this momentous question ought not to terminate with the present visitation, as it seemed to have done with the former. Men should diligently employ the present time in making observations and recording facts, and preparing themselves, and preparing others, to understand somewhat better, and to obviate somewhat more successfully—if that be ever possible—the fatality of this formidable and mysterious malady.

Too much attention has been paid in this country to the remote or occasional causes. This has tended to divert the mind from the fact that cholera is an *imported* disease; and however much it may be under the influence of such causes, as all diseases are, they afford no explanation of the *manner* in which it has been introduced and established. That would appear to be one great fact to which our inquiries should be directed. Were we to judge from the notices put forth by authorities in England, all that is required for the production and spread of cholera is to be found in impure air, arising from filth and dirt—from stagnant and

even flowing waters, crowded populations, and all the various other matters which have so much occupied the attention of the public, while the removal or abatement of these nuisances was all that was required for its suppression—in short, that cholera was the most manageable of all known diseases, and was completely under our power. Let us examine the matter a little more closely.

Cholera is said to originate and to prevail precisely where typhus originates and prevails. The connexion between cholera and fever was not unnoticed in India, and it is not to be denied that, in such localities, cholera does prevail with more intensity than in those of an opposite description. It is also said that towns situated on rivers are most obnoxious to cholera, and the poorer than the richer classes. But another explanation of this may be given. Are not almost all our great towns situated on rivers? The banks of rivers must be low, in reference to the adjacent country; and, from whatever cause originating, we uniformly find that the lower parts of towns—those lying on the banks of the rivers—are inhabited by the poorer classes. Where the poor dwell, the population is always the most dense; while the richer classes, resorting to higher and more favourable ground, present a population comparatively thin. Now, if we take the relative proportion of towns situated on rivers with those not so situated, and the relative proportion of the poor compared with the richer classes—perhaps a hundred to one—we shall probably find that the alleged disproportion in the two cases of towns or classes attacked, whether with fever or cholera, will bear a much stricter relation to *numbers* than to the local circumstances in which the towns and the classes are placed.

A general impression has prevailed, however, both in India and in this country, that the vicinity of rivers exerted a

remarkable influence on the prevalence and intensity of cholera; and, in particular, that bodies of troops, encamped on their banks, ran much greater risk of being attacked by it than in any other situation. But in Dr Lorimer's report it is stated that, of 121 epidemic outbreaks, only 37 occurred on the banks of rivers—52 at distances varying from one to fifteen miles, and 32 at a distance beyond fifteen miles: in short, that 84 out of 121 attacks had no connexion with the vicinity of rivers, which seems to prove that, after all that has been said on the subject, there was no good ground for the opinion that such localities were more dangerous than others.

It is not denied, that the general health of a class of people who live in densely-crowded and impure localities will be deteriorated, and that those whose constitutions are impaired by labour, want, and dissipation, will become more predisposed to disease of every kind, and less able to withstand its effects, than the other more fortunate classes who are exempt from these evils. But all these things bear no special relation to cholera; they exist everywhere, and in the most concentrated form, where yet cholera has not been known. They are neither the cause of cholera, nor does the exemption from them confer any absolute safety from it. That disease spares neither rich nor poor, nor age, nor sex, when once it is established in a place.

Sanitary regulations, having the enforcement of cleanliness, drainage, sewerage, &c. as their object, will doubtless produce much good, and they form, very properly, the subject of anxious care with municipal authorities; but it is not to them, nor to the things that give rise to them, that the philosophic inquirer has to look, in his investigation into the rise and progress of cholera. It is quite true, that certain local influences, enhancing the prevalence and

malignity of the disease, have been too often manifested to permit us to doubt of their existence. In India it has been observed that certain tracts of country, and even particular spots, or villages, were extremely dangerous to travellers, and to parties of troops passing them. In the same manner, certain towns in this country, and on the Continent also, have suffered most remarkable attacks of cholera; and yet these places do not present anything in their sites, or their internal economy, that distinguishes them from hundreds of others. For example, the small town of Bilston, with a population of only 14,700, had 3568 cases of cholera in 1832, of whom 742 perished; while Birmingham, distant only ten miles from Bilston, escaped cholera on that occasion, although nowise different from Bilston in situation, the nature of its population, or sanitary condition. Again, the town of Dumfries, including Maxwelltown, on the opposite bank of the Nith, both in 1832 and 1848, suffered in a like remarkable manner from cholera; having, in 1832, out of a population of 12,000 or 13,000, about 1074 cases of cholera, of which 548 proved fatal; and in 1848, about 830 cases, and 430 deaths, as far as can be made out from extremely inaccurate returns respecting the town of Dumfries itself. Now, Dumfries and Maxwelltown, though lying low and on the banks of a river, and probably dirty enough, do not enjoy so bad a pre-eminence in these respects as to account for the severity with which they have been visited. Many other towns, especially seaport towns, and in an especial manner, London itself, along both banks of the Thames—a river represented as being fraught with poison—present as many, or even more, of all the commonly assigned causes, and have yet enjoyed hitherto, a most remarkable immunity.* Whether the poison of cholera, in

* In the *British and Foreign Quarterly Review* for January 1849, Part xxx., there

the particular instances cited, found something in the air of the place congenial with itself, or whether the general health of the inhabitants had been, in some occult manner, so far affected by peculiar local influences, as to predispose them in an unusual degree to the attack of cholera, is not known, but the subject deserves the most careful examination by those in a situation to make it.

In all parts of the world, cholera appears to follow a remarkably uniform course in its epidemic attacks. After lingering for a few days at the commencement, generally five or six, it suddenly acquires greater force—reaches its acme in about fifteen days more—begins then to decline, and ceases generally in from four to six weeks from the beginning of the attack. With a similar uniformity, almost all the cases that first occur terminate fatally, from the greater predisposition of the subjects. As the disease advances, persons less predisposed fall under its influence, and recoveries begin to take place, and these go on *increasing* as the *predisposition decreases.* Eventually many persons exhibit signs of disorder akin to, but yet not actual cholera, from which we would infer that the choleric influence acquires strength as the disease progresses or is more generally diffused, and it is then only from the want of constitutional susceptibility in individuals that its in-

occurs this very curious remark: "When Mr Scot ransacked the writings of the older English and Dutch surgeons, and the records of Hindoo medicine, to discover evidence of cholera being known to his predecessors at Madras, could he have overlooked the fact, that at Chintadrapett, at his own door, cases of the disease he was investigating occurred year after year?"—alluding to an observation by Mr Rogers, in his late publication, that cases of cholera occurred in a suburban village of Madras, when a filthy river, the Coom, that encircled it, occasionally became dry. Now, Mr Scot wrote the Madras Report in 1824. Mr Rogers arrived in India in 1828, and was simply describing what he himself saw, probably some ten or fifteen years afterwards, distinctly prefacing his remarks thus: "Since the first appearance of cholera in 1817, India has never been entirely free from it." What can the reviewers mean?

fluence is at last resisted. We may hence be led to receive with some degree of hesitation the accounts that are given of the great effects of sanatory precautions and preventive measures, of which so much has been said; for, by the time that these are put into effective operation, the disease will have naturally reached its culminating point, and have begun to decline of itself. By tables prepared, seemingly with much care, by Dr Lorimer, it appears that, out of 121 epidemic attacks, 88 terminated within 30 days—that is, in the camp of a marching regiment; and in twenty of the severest attacks, the disease reached its culminating point at about the fifteenth day. In Dumfries, both in 1832 and 1848, when the attacks were particularly severe, they followed precisely this course, getting ahead on the fifth or sixth day, reaching the summit at the fifteenth to the twentieth day, and then subsiding.

It may be stated to be a general rule, that an epidemic outbreak of cholera in any given place will be of short duration, in proportion to its virulence and intensity, and of lengthened duration, in proportion to its mildness.

With regard to the influence of seasons on the rise and progress of cholera, it is stated in the report, that in India, the appearances of the disease were nearly equal in *hot* weather and in *cold*, but that they were doubly more frequent in *dry* weather than in *wet*. That observation, however, refers chiefly to the time of its first epidemic outbreak, when it would seem to have disregarded all laws of climate and temperature. Latterly, it had been observed to follow a more regular course, and to begin to manifest itself more especially on the setting in of the hot season in April and May. It seems certain that cold and wet weather is not, in ordinary circumstances, particularly favourable to cholera—a fact of some significance in relation

to this country, where, in both instances of its visitation, it has made its appearance in the winter season. But with respect to bodies of troops on the march, this remark must be qualified, it being stated in a late report to the Madras government, by Dr Lorimer, embracing a period of more than twenty years, that in the *cool* and *dry*, and *hot* and *dry* weather, the ratio of epidemic attacks is nearly the same; and in *cold* and *wet*, and *hot* and *wet* weather, the ratio is also the same; but in *rainy* weather, whether cold or hot, the ratio of attacks is nearly double. This would seem to be explained by the circumstances attendant on a march in the monsoon season in India, as the Medical Board, in remarking on Dr Lorimer's Report, makes this observation—"The division in which the vicissitudes of climate are the greatest, (Nagpore), and that in which the climate is most equable, (Malabar), stand next to each other in the comparative prevalence and mortality of cholera, showing that climate alone can in no way account for outbreaks of this disease, however variable, or however steady it may be." 1845.

Amongst the atmospheric phenomena supposed to be connected with the appearance of cholera in India, it may be of interest to mention a certain aspect of the sky, which proved too often to be the harbinger of an outbreak. This was a dull leaden-coloured suffusion, obscuring the sun, yet totally without any distinct form of cloud—an ominous canopy, without motion, and attended with a certain chilly feel in the air. If this continued for several days, we were certain to hear of cholera; and the disease would cease on this appearance of the sky breaking up, especially if ending in a storm. There may have been something of imagination in all this, but, nevertheless, the belief was general. The same aspect of the sky occasionally takes place in this coun-

try when cholera does not exist, and it can only be taken as one of those abnormal states of the atmosphere, under which, if the choleric influence is present, it will be brought into activity. Some of the most formidable attacks of cholera have taken place during the excessive heats, when there was not a cloud in the sky, nor a drop of moisture on the face of the earth ; and in the case of marching regiments, where the ground of encampment was changed every day, and consequently when there was a total absence of all those causes of excitement which have so much occupied attention in this country. Neither are instances wanting where this mysterious disease has spared the poor and needy, and fallen exclusively on the wealthy and comfortable. A most remarkable example of this happened at Madras in 1824, during the hot season, and at a time when cholera did not prevail either amongst the inhabitants or the troops. It suddenly attacked the first member of the medical board, the chief secretary to government, the senior partner of one of the principal mercantile firms, and the lady of a field-officer of H.M. service, all of whom died in the space of one or two days. At the same time a member of council and a judge of the supreme court were taken ill, but recovered. Shortly afterwards the officer commanding the governor's body-guard and his mother-in-law were taken ill and died. But the most remarkable circumstance was, that every one of these parties, excepting one lady, occupied adjacent houses, widely separated, however, by large gardens, as is usual there ; and they were situated on the great Mount-road, one of the best and healthiest localities of Madras. All were previously in good health. My own house was in the same place, and I attended the three first cases. No local cause could be assigned, nor did the disease spread farther. The sky at the time was suffused, a

long-shore wind blowing, very damp and relaxing, with a very hazy atmosphere; but the health of the community was not affected. These are some of the incomprehensible things connected with the history of the disease.

What, then, is cholera? Is it purely an atmospheric disease, caused solely by the presence of some morbific agent or quality in that element, and irrespective of emanations from the persons of those who are afflicted with it? In what manner is the supply of this morbific matter in the atmosphere kept up, so as to enable its influence to be transported over tracts of many thousands of miles? Is there any quality in this morbific principle by which it can assimilate the atmospheres of other regions to its own condition, as it comes in contact with them? How does it progress against adverse winds, and in what manner does it diffuse itself, so as to touch one place, avoid another, and spread at times in the most opposite and unexpected directions? Can it be explained how this poisonous atmosphere does not affect a whole population at once, more especially on the sea-board of a country lying opposite to the quarter whence it is acknowledged to come, and that across the sea, instead of appearing only in one seaport town—Hull—and then after the arrival of a ship from Hamburg with the disease on board? These questions may perhaps be answered by saying that in all these respects cholera only follows the laws of other epidemics. But that leaves the matter wholly unexplained, an epidemic signifying simply a disease which prevails at the time to a considerable extent. The term conveys no explanation as to origin or method of diffusion, nor indeed as to the nature of the disease so prevailing, which may be infectious or otherwise; it leaves the whole matter an open question. How then a stream of poisonous or morbific air, capable of

producing this sole disease, should either be wafted entire, or by progressive fusion or amalgamation be propagated from Hindostan through Persia, Russia, Poland, Prussia, then to Hamburg, thence to Hull, London, Leith, Dumfries, Glasgow, Belfast in Ireland, and finally to North America, across the wide Atlantic, leaving many adjacent tracts of country and all southern Europe, for the time at least, untouched? Or how this can be effected in the face of adverse winds, through every variety of climate or season, and in a comparatively narrow stream, is a thing which even imagination cannot grasp; and that can only be believed on the ground of its being some special dispensation of Providence. Or, on the other hand, is cholera a disease, which, originating in a particular climate, possesses the power of propagating itself by means of a peculiar and specific virus emanating from the bodies of those affected by it, and producing the same disease in others who are exposed to it, constituting it, in fact, a contagious or infectious disease?

An attempt has been made in the Report to give a brief and impartial review of the opinions entertained on either side of this important question by the medical profession in India. But it must be observed that, excepting the exanthemata, infectious diseases can scarcely be said to exist in that climate. Typhus is comparatively rare, and chiefly to be seen in men recently arrived from England, and then not in an aggravated form; while there is such complete openness and freedom of ventilation, and generally such ample space in the houses, barracks, and hospitals, that, even in the case of an acknowledged infectious disease, the chance of communication is greatly lessened. The houses of the natives again, though generally small and confined, are still uniformly independent of each other;

there is no crowding of families in one house as in Europe. All these circumstances render the chance of infection much less in India than in Europe; and it is in the latter country, therefore, that the question is most likely to be determined by reference to individual instances either of seizure or escape. As far as India is concerned, we can scarcely bring forward a single fact that may not be met by one of a directly opposite tendency. For example, it is mentioned in the Report that, in the hospital of H.M. 69th regiment, when the attendants were doubled, not one individual was attacked, while in the Bombay Report it is stated that in the hospital of H.M. 65th regiment *every one* of the native attendants, thirty in number, were seized with the disease!

The first invasion of cholera in 1832 would appear to have left the question in abeyance, but the facts of the case remain on record, and may be still available. The present invasion will doubtless have afforded many opportunities of stricter observation in relation to individual evidence; and it were better, perhaps, to confine inquiry for the present to a consideration of those circumstances which have marked its progress from place to place. I am not in a condition, however, to enter on this inquiry, nor is the time yet arrived when the evidence, either on one side or the other, can be considered to be complete. As far as it has yet gone, cholera is confidently said to have first appeared in a place to which some person from an infected quarter has come, and then been taken ill, or has actually brought the disease with him.* But, even without the

* The following notices by Mr Moir of Musselburgh, are here given as an illustration of the manner in which cholera appears to have been introduced into one place from another:—

INTRODUCTION AND SPREAD OF CHOLERA AT PRESTONPANS, KIRKLISTON, AND CARRINGTON.

MUSSELBURGH, 2*d March* 1849.

MY DEAR SIR,—I promised to send you some corroborative proofs of cholera being

proof of such instances, the general progress of cholera, as we see it at present, can scarcely be accounted for in any other manner.

While on this subject, it is worthy of note, that out of 95

a contagious disease in Scotland, from a sketch of its introduction recently into some of the localities in this neighbourhood ; and I have selected Prestonpans for the purpose, from being fortunately enabled to obtain undoubted information regarding the first appearance of the disease there, and of the communication and consanguinity subsisting between the original victims.

Without offering a word of comment, I subjoin a list of the first twenty-three cases, as successively registered in the books of the inspector of poor for the parish, and which have been extracted for me by my friend Dr Thomas R. Scott. For the local information I am indebted to Mr William Alexander, salt-manufacturer, a gentleman resident on the spot, and who took a prominent part in the enforcement of local sanitary measures.

Case I. Grace Blyth, seized on the 24th November, died on 25th. Returned from Gilmerton on the 23d, whither she had gone to visit a relation labouring under cholera there.

Case II. Jane Gibb, seized on 6th December, died on 8th. Washed the clothes of Grace Blyth on the day previous to her own attack.

Case III. George Mitchell, seized on 7th December, died same day. Lived in the house adjoining the two first cases, and had visited both.

Case IV. Fanny Gibb, seized on the 8th December, died same day. Sister of Jane Gibb, and laid out her body after death.

Case V. Widow Bartleman's child, seized on the 8th December, recovered. House adjoining the two others.

Case VI. Mary Anne Gibb, seized on 10th December, and recovered. Niece of Jane and Fanny Gibb. She was in service at Musselburgh, and was sent for to nurse her relatives.

Case VII. Jane Troup, seized on 10th December, and recovered. The first six cases occurred at the western extremity of the village. Jane Troup, who went about collecting rags, got possession of some of the clothes of Fanny Gibb ; took them to her house in the centre of the village, (the Big Wynd) and was attacked on the succeeding day.

Case VIII. Alexander Troup, seized on the 11th December, and died on the 16th. Husband of Jane Troup.

Case IX. Widow Bartleman, seized on 14th December, died on 16th. Mother of (Case V.)

Case X. Mrs Frazer, seized on 14th December, and died on 15th. Attended Troup and his wife during their illness. Lived in adjoining house.

Case XI.

Case XII.

Case XIII. *Two* children of Mrs Frazer were seized on the 14th December, shortly after their mother ; a *third* on the 15th ; and all three died on 16th.

Case XIV. Elizabeth Notman, seized on the 15th December, died on 16th. Attended Jane Gibb and several others. Washed Gibb's clothes.

Case XV. James MacKenzie, seized on 15th December, and died on 16th. Lived in the upper flat of Troup's house, and visited the family repeatedly during their illness.

regiments, which marched through districts of the Madras presidency affected with cholera, 83 were attacked by the disease, and 12 escaped; but of these 12 it is distinctly recorded, that in 7, the utmost care and vigilance was ex-

Case XVI. Margaret Notman, seized on 16th and died on 17th December. Daughter of Elizabeth Notman. (Case XIV.)

Case XVII. James Cameron was seized on 17th December, and died same day. Lived in house adjoining previous cases. (XIV. XVI.)

Case XVIII. Widow Crawfurd, seized on 17th December, died on same day. House adjoining Troup's and Frazer's, both of which families she visited.

Case XIX. Jean Deans was seized on 17th December, died same day. Aunt of Mrs Frazer.

Case XX. Margaret Gordon, seized on 17th December and recovered. Sister-in-law of Jean Deans, and washed her clothes.

Case XXI. Jean Hunter, seized on 17th December, and recovered. Lived in house adjoining that of Blyth, the Gibbs, and Mitchell, at west end of the village, all of whom she visited during their illness.

Case XXII. Janet Deans, seized on 17th December, recovered. Sister of Jean Deans.

Case XXIII. Margaret Notman, seized on 19th December, and recovered. Sister-in-law of Elizabeth Notman, (Case XIV.,) and mother-in-law of Mrs Frazer, (Case X.)

The total number of cases which occurred at Prestonpans was fifty-two, and the deaths twenty-seven. As I challenge investigation of this statement, you, my dear sir, may make any use of it you please.

Ever most truly yours,

William Scot, Esq. D. M. MOIR.

P.S.—Since writing the above I have received the following strongly confirmatory statements relating to neighbouring localities—Kirkliston and Carrington; and I select them from among many others, which have been recently kindly forwarded to me, as comprehending the two great points at issue, in reference to the contagiousness or non-contagiousness of cholera,—the importation of the disease from an infected district, and its spread from that importation in a previously healthy one. The first series of cases has been furnished to me by my quondam pupil, Dr Andrew Legat of Ratho; the other series by Mr Thomas Thomson, surgeon, Gorebridge, who also writes from personal observation.

Up to Wednesday 14th February, the parish of Kirkliston had kept perfectly free from cholera, when, at eleven o'clock on the evening of that day, an Irish labourer, John MacGochie, accompanied by his wife, arrived at the railway station there. Both went to bed apparently well; but, in a few hours, decided symptoms of the disease exhibited themselves in the woman. They had come from Ambleside, *via* Kelso, an infected town, where they had slept on the night preceding. She died on the forenoon of Friday the 16th.

Case II. Occurred in Ronald Gillies, a Highland labourer, who lodged in the second hut from MacGochie's—the door of which he had to pass in getting to his own, and many times did so, between the Thursday and Saturday when he took ill. Was at work on last-mentioned day, 16th, but had to come home. Died on Sunday 17th, at nine A.M.

ercised to prevent all intercourse with the infected villages. Again, during the march of 308 regiments through districts where cholera was *not* prevailing, only 32 experienced an outbreak of cholera. In 60 regiments, conveyed in at least

Case III. John MacGochie, the husband of Mary, (Case I.,) sat up with the body of his wife, during the night of Friday 16th, and buried her on the following day, up to which time he felt well. Immediately after the funeral he went forward to Edinburgh, where he became ill, and was removed to the Cholera Hospital. He recovered.

Case IV. The next person attacked was Miss Braid—the sister of Mr Braid, surgeon. On Sunday morning, her brother—who was by this time himself labouring under the premonitory symptoms—went directly home from the bedside of Gillies, (Case II.,) on whom he was in attendance, to his own house, which is at the opposite extremity of the village, and remained beside her for a considerable time before again venturing out. She was seized in the course of the day, and died during the night following.

Case V. Poor Mr Braid himself was the next who followed. As already mentioned, he had been complaining for two days previously ; but it was not till Monday 19th, at midnight, that cholera decidedly showed itself. At eight, on the preceding evening he had assisted in placing the body of his sister in her coffin ; and, at that time, said "he felt he was in for cholera," owing to some peculiar sensations. Death followed at eleven A.M., on Tuesday the 20th.

Case VI. Occurred on Wednesday night, in a part of the village still more remote from the original sphere of infection. It was in the person of Mrs Grindlay, the woman who acted as nurse to Mr Braid. She also died.

Case VII. Brings us back to the original locality. Mary Kerr, a woman inhabiting the house next MacGochie's, (Cases I. and III.,) was attacked early on the morning of Thursday the 22d. While in attendance on case first, Mr Braid had come into her hut to rest, and he remained there for some time ; and she said *she felt aware of a peculiar heavy smell* about his person, which nauseated her. On that day she took bowel complaint, which, however, continued moderate until Thursday 22d, when the disease assumed its more decided and virulent form. She recovered.

Case VIII. (and last) was John Gillies, a brother of Case No. II., and who lived in the same house. After labouring under the premonitory symptoms for some days, the disease assumed its more decided form ; but he also recovered.

As a preamble to the Carrington cases, communicated by Mr Thomson, it seems necessary to state, that, while the pestilence was at its height in Glasgow, Mr J——n, a mercantile gentleman there, fell a victim to it. This happened to be a son of a respectable farmer in the parish of Libberton, adjacent to Edinburgh, who sent a brother of the deceased to bring home his remains for interment. This unfortunate proceeding was followed by the seizure of two brothers and a sister, one of the former of whom died — the one who had brought the remains from Glasgow ;— and, a servant girl having exhibited the premonitory symptoms, she was conveyed home to Carrington, a locality some eight or ten miles southward, hitherto unaffected.

Case I. Janet Inglis, servant at Straiton, in the parish of Libberton, came home on the 8th January, labouring under symptoms of cholera. She recovered.

Case II. Mrs Inglis, her stepmother, was taken ill on 13th and died on 14th. Nursed her step-daughter, during her illness.

Case III. Mrs Lyell, aunt of Janet Inglis, was in attendance on both the preceding

200 ships to different quarters, they all effected the voyage without cholera, save in one instance, and in that one instance the disease had been appearing amongst the men before embarkation. On the whole, it is not probable that the question of the infectious or uninfectious nature of cholera will be settled either by argument or by authority. Men will judge and reason for themselves on what they see and hear; a conviction of the truth, whatever that may be, will gradually arise in the mind. Men will feel a thing to be true, though they may not be able to understand or explain it. Inquiry appears now to be directed with more seriousness than formerly to the investigation of the circumstances attending the introduction and progress of cholera. It has become more of an open question, and it is to be hoped that it will receive its solution in the hands

cases. She was seized on the 16th and died on 19th. Her house was next door to that of Mrs Inglis.

CASE IV. (and last.) James Inglis, father of Janet Inglis, (Case I.,) husband of Mrs Inglis, (Case II.,) and brother of Mrs Lyell, (Case III.,) was seized on the 16th and recovered.

To the three sorites here succinctly given, I could add many more in my possession, connected with the recent reintroduction of cholera to Scotland from Hamburg. When, by the doctrine of chances, these are satisfactorily accounted for, the others shall be at the service of the public.

It has been frequently maintained, that the average rate of mortality is not increased in the localities where cholera has prevailed. As I do not think you allude to this topic in your Report, I have subjoined, from the recorder's books of the parish of Inveresk, in which Musselburgh is situated, the following abstract :—

General average mortality in parish of Inveresk, for the three years preceding the first appearance of cholera in 1832—176. Funerals, from the outbreak of the disease, 19th January 1832, to 19th March—two months—282. We thus find that, in two months, the number of deaths exceeded the annual average mortality by 106.

From the same source, I give the mortality for the November and December 1847, and for the corresponding months of November and December 1848, when cholera had a second time visited the district.

1847.	Deaths in November, ...	32	
	Ditto in December, ...	24	
			— 56
1848.	Deaths in November, ...	42	
	Ditto in December, ...	68	
			—— 110

of those who, without prejudice or preconceived theories, allow themselves to be dispassionately guided by what they see around them.

In conducting an inquiry of this kind, attention must be had to a fact which would appear to be peculiar to cholera, distinguishing it from all those diseases of the pyrexile class, which are acknowledged to be contagious. In all these, after the infection has been received, a certain time elapses before the disease can be developed—a period of incubation, as it is termed. The *minimum* of that period, in all known infectious diseases, greatly exceeds the *maximum* in cholera. That disease may be, and frequently is, of immediate development; that is, a person, coming within the range of the choleric influence, is taken ill immediately. A remarkable instance of this, and quite conclusive of the fact, is stated in the Report—that of H. M. 41st regiment. They landed in perfect health from shipboard in Madras Roads, marched into barracks in the fort, and many of them were seized with cholera that same morning. The expression of the surgeon, in stating the circumstance to me, was, that "the men were seized before they had their knapsacks off their backs." Girdleston likewise states, that within the first three days of their landing, fifty fresh men of the troops were cut off by cholera. Innumerable instances, both in India and in Europe, of individual seizures taking place in a very short time after exposure, could be cited: and the fact is important in two respects; first, as demonstrating the extreme power and subtlety of the choleric virus; and, secondly, as exhibiting a peculiarity in its mode of action. In the first, we may have an explanation of the occasional failure of quarantines and *cordons sanitaires* in keeping off cholera, as well as of the failure of individual seclusion in towns or places where cholera pre-

vails. No one can tell how often such measures of precaution are successful, as successful they probably are on many occasions; but every one can tell when they are unsuccessful. The morbific agent seems to be too subtile, too powerful, too unconfinable, to be kept within those bounds which limit the infecting powers of pyrexile diseases. When cholera has once established itself in a town or village, or in the camp of a marching regiment, absolute contiguity, or personal intercourse, does not appear to be necessary for the spread of infection. The choleric poison pervades the air. This appears to be conceded even by those who contend against specific infection, since they allow, that in large masses, and confined spaces, an infecting agent *may* be generated. This, therefore, reduces the question merely to one of degree. Perhaps the truth of this may be, that in large masses the evidence is overwhelming; in individual cases there is more room for argument.

In the second—viz., the peculiar action of the choleric poison—we find a proof that it is not the same process that obtains in infectious pyrexile diseases, inasmuch as it seems certain that we can cut short and immediately arrest the action of cholera on the system, which we cannot in any way effect in the pyrexile, as in them the infection, once received, will run its course in despite of all our efforts. Here, then, we have very strong evidence—if not, indeed, an actual proof—that cholera is not a disease of the blood, nor connected with the lesion of any organ. Its attack is sudden, and its arrest is sudden; and we are hence warranted in concluding that it is a *functional*, not an organic disease. Now our knowledge, such as it is, in respect to the laws which govern the known contagious or infectious diseases, may not be applicable to the laws governing a disease of a totally different nature. At all events, it is

now time that we should manfully look the question in the face: we shall not lessen the danger by hiding it from view. If the doctrine of the infectious power of cholera should be satisfactorily established, we may not, indeed, be able altogether to shut it out, but we may be able, nevertheless, to effect much towards restricting the evil, by isolating the sick, by the avoidance of infected places, by greater caution in exposure, when duty calls us to mingle with and minister to the sick, by wholesome and judicious quarantine, and so forth. Whatever the truth may be, it should be known. The great danger is not in alarm, but in the want of alarm: people do not desert their friends and relations labouring under other known infectious diseases. Neither will they in this; but they will avoid unnecessary exposure and unnecessary communication of friends and relations, as they now do, in point of fact, in most other instances of known contagious disease. If, on the other hand, cholera should be satisfactorily proved to be a non-contagious disease, and that comfortable doctrine be firmly established in the public belief, it would be superfluous to dwell on the advantages which would result therefrom to the community at large.

In conclusion, it is common to hear it said that cholera is not an infectious disease, but only an epidemic. Now it may be asked, what other epidemics are not infectious? We scarcely know of any. Influenza cannot be said—at least it is not proved—to be an exception. There appears, indeed, to be an affinity between it and cholera. In this country it is considered to be the precursor of cholera. It is not so in India, because influenza is not frequent in that climate. It has been said, that all our fatal epidemics have come from the east; but the reverse is the case here, for the influenza came to India from the west, and in 1823–24

involved the whole community in universal prostration and suffering. It has been asserted that there is no similarity between the progress of cholera and influenza, the latter being a purely epidemic disease, manifestly depending on a certain cold, raw, and damp state of the atmosphere, and invading whole countries at once. But in India, influenza prevailed in the hot and dry season, and certainly did not invade the whole country at once, but progressively; more rapidly, indeed, than cholera, but in other respects very much like it; and like it, too, in bidding defiance to a total difference of climate. By influenza is not here meant those catarrhal affections which too often bear its name, but that singular form of disease which, coming like a plague, prostrates nations; whose attack seems as sudden as that of cholera itself: a disease which, in the severity of its symptoms, and its total derangement of the system, would be truly appalling, were we not taught by experience that it is not essentially a fatal disease. The term implies, I believe, merely a power or influence, referable to some unknown connexion with the heavenly bodies, or with the atmosphere. In that respect it may rank with cholera, and there appears to be some striking resemblances between the two diseases. They each affect the mucous membrane—cholera that of the stomach and bowels, influenza that of the air-passages. But, unlike cholera, the class of people chiefly affected by influenza is that of the rich and comfortable, in whom that portion of the mucous membrane, which lines the air-passages, acquires a greater degree of delicacy, from their artificial mode of life, than it does in the labouring classes, whose more habitual exposure to the open air, and to all the vicissitudes of the weather, renders them less liable to affections of that kind. On the other hand, cholera, affecting the mucous membrane

of the stomach and bowels, the richer classes would seem to be less subject to it, because in them their more generous diet, their more wholesome food, their better clothing, their better protection from external influences—all conspire to give greater tone and vigour to the mucous membrane, the seat of cholera, than can obtain with the poorer classes, whose food is too often irregular and scanty, and of an unwholesome and debilitating quality. Again, when we reflect on the debilitating effects of influenza, the total prostration of strength, the unhinging of the whole system, so to speak, which attends it, while so small a surface is affected, we may be led to appreciate the fatal effects which an affection of the much more important and widely extended surface of the mucous membrane of the stomach and bowels, which in some shape or other invariably attends cholera, must naturally produce. The same inordinate flux of saline humour attends both diseases; the functions of the nerves of smell and taste are suspended in influenza—the much more important functions of the nerves connected with the processes of digestion, the assimilation of the blood, and the circulation, are suspended in cholera.

Cholera may therefore be regarded—somewhat fancifully, I admit—as an *influenza*, in the proper sense of the term, of the mucous membrane of the stomach and bowels, leaving its exciting cause, whether an animal poison, an atmospheric poison, or what not, acting on some portion of the ganglionic system of nerves, in as much obscurity as before; but if we shall ever succeed in discovering the proximate and remote causes of the one disease, we will go far to discover those of the other.

EDINBURGH, *March* 1, 1849.

REPORT

ON

THE EPIDEMIC CHOLERA.

When the Epidemic Cholera seemed to have completed its progress throughout the territories of this Presidency, it was intimated by government to the Medical Board, "that the interests of the medical science and of humanity would probably be promoted by a history of that disease, as it had appeared amongst the population, as well as amongst the troops; with an account of the various modes of treatment which had been at different times adopted by different medical officers at their respective stations, and the success with which they had been attended."

The Honourable the Court of Directors have also subsequently ordered, that the particulars of the progress of cholera through these territories, and the different modes which had been adopted in the treatment of persons afflicted with it, should be prepared and printed. In making this communication the Honourable Court stated, that they had caused the reports which had been drawn up, under the superintendence of the Bengal and Bombay Medical Boards, to be circulated amongst the most eminent of the Faculty in England; and the Court expressed

their hope that the circulation of these documents, together with that of a similar report from this Presidency, might tend to produce opinions and advice calculated to check the ravages of this afflicting malady. It is in pursuance of these instructions that the present report has been prepared.

In addition to the measures for collecting professional information, which the ordinary discipline of the service implies, the Medical Board did not neglect, upon the first appearance of the epidemic cholera, specially to call the attention of all medical officers on this establishment to the necessity of contributing such remarks respecting the disease as their opportunities for observation might enable them respectively to do; and it is a just tribute to the profession to state, that the call has been fully answered by almost every member of it. A mass of information has thus been furnished, which leaves to the writer of this report little else than the labour of selection and arrangement. Many valuable communications have been received in a condition fitting them to be at once offered to the public; and these will accordingly be found under the proper head in this report. Others, forming indeed a great proportion of the whole, though intrinsically valuable and extremely interesting, are yet drawn up in a desultory manner, and in an insulated form, which precludes the propriety of their publication. In disposing of the contributions of the latter description, the utmost care has been taken to embody the facts and observations contained in them, under the properheads of pathology and therapeutics. No observation has been set aside *merely* as being improbable, no theory absolutely rejected *merely* as being untenable; for our present state of knowledge with regard to cholera did not appear to warrant the absolute rejection of any medical opinion concerning it. Every alleged fact and distinct theory, therefore, which have been recorded. find a place in these pages, and are thus left to be tried

by the test of time and experience. So scrupulous, indeed, have the Medical Board been in the exercise of their authority, throughout the course of this destructive disease, that, even at the hazard of incurring the imputation of empiricism, they have given currency to the notice of remedies, and sanctioned their trial, although the exhibition of them might be little supported by any received system of medicine.

It would doubtless, in some respects, have been more desirable, in an official report, to have published every communication as it had been received, and with the name of its author, rather than to offer a digest of them; but, independently of the objections that have just been assigned, there existed another, which was, the great uniformity of these reports—for, though all medical officers have not been equally fortunate in their opportunities of observation, nor possessed of equal leisure and an equal degree of zeal in the cause of science, yet by far the greater proportion of the reports, though occasionally relieved, perhaps, by a diversity of opinion on the *theory*, still present, in respect to the *history* of the disease and general plan of *treatment*, a repetition which it would be altogether unprofitable to publish. It is perhaps more necessary to offer some apology to those gentlemen whose reports, written in haste, and on the first appearance of the disease, are now published at this late period; and had our knowledge of its nature, and method of cure, kept pace with the extended means of observation which the lapse of time has unhappily too amply afforded, there might have been good reason for objection. The best apology, however, will be found in the reports themselves, which, even when contrasted with those written at later periods, and under circumstances in every respect more favourable, will still be found to present most interesting matter, and to redound greatly to the credit of their authors, many of whom are now no more. Whenever supplementary remarks have

been received from the same writer, they have been appended to his original communication.

Although no paper is inserted in this report which is not official, or authenticated, nor anything advanced, unless founded on materials exclusively of that nature, yet it is nevertheless to be remembered, that medical *facts* are too often merely medical opinions: their authenticity, in reference to the views of the narrator, is undoubted; but liable as even the most deliberate and sagacious observers are to error and misconception, we are bound to receive with due caution and circumspection any *facts* or *opinions* which are palpably at variance with general experience. It is presumed, however, that the report will be found, upon the whole, to convey a very considerable and unexceptionable mass of evidence respecting the nature of that species of cholera which has so long afflicted the Indian community; and, while we sincerely hope that the actual presence of the disease in Britain will never afford more immediate means of judgment, we would still echo the sentiment of the Honourable Court, that the eminent of the Faculty there may be more successful in their researches into its nature, cause, and cure, than their brethren in this country have been.

While the constitution of the Company's medical service is singularly well adapted for the collection of information, this advantage has almost been rendered a dead letter from the want of periodical printed reports—a want the more especially felt in a country where the change of functionaries is rapid and perpetual; and, consequently, where individual or personal knowledge is of less public avail. The evil here complained of has been strikingly exemplified in the instance of cholera, which, on its first appearance, was considered to be merely a severe or unusual form of the disease known by the name of cholera morbus. This idea, however, being soon, and perhaps too hastily abandoned, a persuasion was then almost universally enter-

tained, that it was in fact *a new disease*; and, with a strange inconsistency, an expectation seems immediately to have arisen, that the nature of this new disease was more perfectly discoverable than the nature of those diseases which have baffled the experience of ages; and farther, that a specific cure for it was no less an object of easy attainment. Hence arose that diversity of opinion, and variety of practice in cholera, which at first generally prevailed, and which, it is feared, still continues to exist to a very considerable degree. When it was found that a complaint, similar in all its symptoms, had been described in several European publications on diseases of India, the knowledge of the circumstance was too confined, and came too late to do away the evil which had arisen. The Indian community, including the medical profession, were taken, as it were, by surprise: the disease, if not new in reality, was new at least to them; and the pre-existence of cholera, in a form nowise different from that which it has on this occasion assumed, has been somewhat reluctantly admitted, and too much kept out of sight in reasoning on its pathology.

Cholera in 1787 *at Arcot.*—This state of things, however, cannot be imputed to the want of foresight in our predecessors; since we find the following notice entered in the proceedings of the Medical Board of this Presidency, under date the 29th November 1787, but which, being confined to a manuscript entry in the records of an office accessible only to its members, it became, as has been observed, a dead letter.

"A disease having in October last prevailed at Arcot similar to an endemic that raged amongst the natives about Paliconda in the Ambore valley in 1769-1770, in an army of observation in January 1783, and in the Bengal detachment at Ganjam in 1781, and several other places at different times, as well as epidemic over the whole coast in 1783, under the appearance of dysentery, cholera morbus, or

mordyxim, but attended with spasms at the præcordia, and sudden prostration of strength as characteristic marks; seeing this Board is ordered to be a record, the Physician-General recommends, as a guide to future practitioners, that a letter from Mr Thompson, surgeon of the 4th regiment, containing an account of the dissection of one of the patients who died of the disease, describing the state of the viscera, may be entered on the face of the proceedings, together with two letters from Mr Duffin, Head Surgeon at Vellore; and one from Mr Davis, member of the Hospital Board, containing an account of the causes, symptoms, and successful treatment of the sick, by the use of the hot bath and fomentations, supporting the vis vitæ with wine, &c., and removing the putrid colluvies from the intestines. The Hospital Board, sensible of the advantages that may result to the service from the mode proposed by the Physician-General, direct their secretary to enter the letters he has mentioned, as follows:"*—

Noticed in Hindoo writings.—Cholera has been supposed to be described in the medical writings of the Hindoos, some of which are of great antiquity, as may be inferred from their being attributed to Dhanwantari, a mythological personage, coinciding in character with the Æsculapius of the Greeks. In a work styled the Chintamani, the disease resembling cholera is classed under the generic term sannipata, which includes all paralytic and spasmodic affections. The species of sannipata, supposed to be the spasmodic or epidemic cholera, is called sitanga, and is thus described: "Chilliness, like the coldness of the moon over the whole body, cough and difficulty of breathing, hiccup, pains all over the body, vomiting, thirst, fainting, great looseness of the bowels, trembling of the limbs." Cholera is supposed

* These letters will be found in the extracts, p. 239. The references to the original papers and reports are retained in this reprint, for the convenience of such readers as may have means of access to the original folio edition of this report.

by others to be classed under the generic term ajirna or dyspepsia. The species, which is considered to correspond with the spasmodic or epidemic cholera, is called vidhumar vishúchi, and is thus described: "The vishúchi is most rapid in its effects; its symptoms are—dimness of sight in both eyes, perspiration, sudden swooning, loss of understanding, derangement of the external and internal senses, pains in the knees and calves of the legs, griping pains in the belly, extreme thirst, lowness of the bilious and windy pulses, and coldness in the hands, feet, and the whole body." The first of these descriptions would apply more perfectly to the epidemic cholera, were it not that, in a commentary thereon, in a Tamil work styled the Yugumani Chintamani, the sitanga is stated to be incurable, and fatal in fifteen days. The latter description is perhaps less applicable, as not noticing either vomiting or purging amongst the symptoms. An attempt has been made to reconcile these two opinions by supposing that the vishúchi is in fact the sitanga in a more virulent or epidemic form: but it is not contended that the vishúchi itself is always epidemic—on the contrary, it is said to be by no means uncommon, and to be described in these familiar but emphatic words, "being seized with vomiting and purging, he immediately died."

Noticed by Bontius in 1629. — The Dutch physician Bontius, who wrote in the year 1629 at Batavia, thus describes cholera morbus: "Besides the diseases above treated of as endemic in this country, the cholera morbus is extremely frequent; in the cholera, hot bilious matter, irritating the stomach and intestines, is incessantly and copiously discharged by the mouth and anus. It is a disorder of the most acute kind, and therefore requires immediate application. The principal cause of it, next to a hot and moist disposition of the air, is an intemperate indulgence of eating fruits, which, as they are generally green

and obnoxious to putrefaction, irritate and oppress the stomach by their superfluous humidity, and produce an æruginous bile. The cholera might, with some degree of reason, be reckoned a salutary excretion, since such humours are discharged in it as, if retained, would prove prejudicial. However, as by such excessive purgations, the *animal spirits are exhausted, and the heart, the fountain of heat and life, is overwhelmed with putrid effluvia, those who are seized with this disorder generally die, and that so quickly as in the space of four-and-twenty hours at most.* Such, among others, was the fate of Cornelius Van Royen, steward of the hospital of the sick, who, being in perfect health at six in the evening, was suddenly seized with the cholera, and expired in terrible agony and convulsions before twelve o'clock at night,—the violence and rapidity of the disorder surmounting the force of every remedy. But if the patient should survive the period above mentioned, there is great hope of performing a cure. *This disease is attended with a weak pulse, difficult respiration, and coldness of the extreme parts; to which are joined, great internal heat, insatiable thirst, perpetual watching, and restless and incessant tossing of the body. If, together with these symptoms, a cold and fœtid sweat should break forth, it is certain that death is at hand.*"

In treating of the "spasm," this author gives the following account: "The disorder of the spasm, almost unknown with us in Holland, is so common in the Indies that it may be reckoned among the popular and endemic diseases of the country. The attack of it is sometimes so sudden that people become in an instant as rigid as statues; while the muscles, either of the anterior or posterior parts of the body, are involuntarily and violently contracted. A terrible disorder! which, without any primary defect of the vital or natural functions, quickly precipitates the wretched sufferer in excruciating torment to the grave, totally deprived of the capacity of swallowing either food or drink.

There are likewise other partial spasms of the limbs; but these, being more gentle and temporary, I shall not treat of them. People affected with this disease look horribly into the face of the bystanders, (truculente admodum astantes intuentur,) especially, as often happens, when the cynic spasm comes on, and both the cheeks are drawn in convulsion towards the ears; a red and green colour is reflected from the eyes and face, (ruber et viridis color ex oculis et facie *oritur ;*) the teeth gnash ; and, instead of the human voice, a rude sound issues forth of the throat, as if heard from a subterraneous vault ; so that, to those unacquainted with the disorder, the person appears to be demoniac."

In speaking of cholera, Bontius nowhere mentions the *colour* of the matters evacuated. He talks, indeed, of æruginous bile ; but that would appear, from the context, to refer to its assumed acrimonious quality rather than to any sensible property ; and we shall presently see that practitioners of much later times dwell greatly on the supposed bilious and irritative nature of the evacuations, when it is pretty evident that they were merely speaking hypothetically. His descriptions, indeed, are not at all full; for though he does not mention spasm as a symptom of cholera morbus, he states that Cornelius Van Royen expired in *convulsions* within six hours from an attack of it. Still in his description of cholera, where "the heart is overwhelmed," where "those who are seized with the disease generally die," and that within twenty-four hours at most ; and in his enumeration of symptoms as marked in italics, every one, familiar with the epidemic cholera as it has prevailed in this country, will probably admit that he has truly portrayed that disease, and no other.

Although Bontius has treated of "the spasm," and of "the cholera morbus," under separate chapters, it is highly probable that these disorders were one and the same. It would seem that he has considered the tonic spasm as idio-

pathic, and the clonic spasm as symptomatic; yet it is evident by the expression, "there are likewise other partial spasms of the limbs," that both these forms of spasm existed in the same patient, a fact which is amply confirmed by innumerable observations in the present epidemic. If it be objected that he does not mention the usual symptoms of cholera as occurring in "the spasm," it may be answered, that neither does he mention the state of the skin, of the pulse, nor of respiration, which functions it is impossible to suppose remained unaffected in such a commotion of the system. The edition of Bontius, which has been quoted from, is an English translation published in London, 1769; but, from the passages in the original, as inserted in parentheses, is is evident that the translation is not quite correct. The expressions, especially, of the eyes and face "*reflecting*" a red and green colour can only be intelligible by supposing that the former were suffused with blood, and the latter changed to that ghastly and cadaverous hue, so familiar to us all in the collapse stage of cholera.

By Dr Paisley in 1774.—The next notice of cholera in point of time we find in the copy of a letter written by Dr Paisley at Madras, dated 12th February 1774, as given by Curtis in his publication on the diseases of India. Dr Paisley says—"I am favoured with yours, and am very happy to hear you have caused the army to change its ground; for there can be no doubt, from the circumstances you have mentioned, that their situation contributes to the frequency and violence of the attacks of this dangerous disease, which is, as you have observed, a true cholera morbus. the same they had at Trincomalee. It is often epidemic among the Blacks, whom it destroys quickly, as their relaxed habits cannot support the effects of sudden evacuations, nor the more powerful operation of diseased bile. The first campaign made in this country, the same disease was horridly fatal to the Blacks, and fifty Europeans of

the line were seized with it. I have met with many single cases since, and many of them fatal or dangerous, of different kinds, arising from putrid bile being disturbed by accidental causes, or by emetics or purgatives exhibited before it had been blunted or corrected."

Dr Paisley does not give any particular description of the disease: and, though he dwells much on the putridity and acrimony of the bile, he does not allude to the colour or appearance of the evacuations. He observes that "when it (the cholera) is epidemic here, it is totally a disease of highly putrid bile, which operates on the system as poison, and brings on *sudden prostration of strength, and spasms over the whole surface of the body*." "In relaxed habits, when the *pulse sinks suddenly*, and brings on immediate danger, the same method must be pursued, but with more caution." The letter is quoted by Curtis as referring to the cholera morbus, or "mort de chien;" and these extracts will probably be deemed sufficient evidence of the correctness of the reference. It is highly important to remark, that Dr Paisley here speaks of the disease as being "*often epidemic*," that it prevailed in that form in the "first campaign," and affected both the Europeans and natives. The particular periods here alluded to are not known, but we have seen, by the extract from the records of the Medical Board, that cholera raged as an endemic in 1769 or 1770.

By Sonnerat, from 1774 *to* 1781.—Sonnerat, whose travels in India embrace the period between 1774 and 1781, speaks of a disease on the Coromandel coast, in all respects resembling cholera, and he notices it as "an *epidemical disorder which reigns*." His account of it is this.

"There is also another epidemical disorder which reigns, and in twenty-four hours, or sometimes less, carries off those who are attacked. It never appears but in cold weather. Debauchees, and those who have indigestions, are attacked with a looseness, or rather with an involuntary flux of the

excrementary matter become liquid, but without any mixture of blood. They have no remedy for this current of the bowels,* which they call a sharp flux, but leave the cure to the care of nature. The flux of this kind which reigned some years ago, spread itself in all parts, making great ravages: above sixty thousand people, from Cherigam to Pondicherry, perished. Many causes produced it. Some were attacked for having passed the night and slept in the open air; others for having eaten cold rice with curds; but the greater part for having eaten after they had bathed and washed in cold water, which caused an indigestion, a universal spasm of the nervous kind, followed by violent pains and death, if the patient was not speedily relieved. This epidemical disorder happened during the northerly winds in December, January, and February; when they ceased, the malady disappeared. The symptoms of this disorder were a watery flux, accompanied with vomiting and extreme faintness, a burning thirst, an oppression of the breast, and a suppression of urine. Sometimes the deceased felt violent colicky pains, often lost his speech and recollection, or became deaf, the pulse was small and concentred, and the only specific which Choisel, a foreign missionary, found, was treacle and drogue amère. The Indian physicians could not save a single person. There is great reason to imagine that the perspiration being stopped and reflowing into the mass of blood, by finding its way to the stomach and bowels, occasioned the vomiting, which terminated by this flux.

"That which followed, two years after, was the most dreadful. It did not proceed from the same cause as the first, as it began in July and August: it first showed itself by a watery flux, which came in an instant, and sometimes cut the deceased off in less than four-and-twenty hours. Those who were attacked had thirty evacuations in five or

* Probably "cours de ventre" in the original. The edition here quoted is a translation by Francis Magnus, Calcutta, printed 1788.

six hours, which reduced them to such a state of weakness that they could neither speak nor move. They were often without pulse; the hands and ears were cold; the face lengthened; the sinking of the cavity of the socket of the eye was the sign of death; they felt neither pains in the stomach, colics, nor gripings. The greatest pain was a burning thirst. Some brought forth worms by stool, others by vomiting. This cruel pestilence affected all the castes in general, but particularly those who eat meat, as the Parias. The native physicians succeeded no better in their treatment of this disorder, which was again renewed during the north winds."

It is by no means easy to determine the precise dates of the epidemic visitations of cholera alluded to in these extracts, as prevailing, in the first instance, "*some years ago*," and in the second, "*two years after*." It is, however, reasonable to suppose, that a disease which "spread itself in all parts," and carried off "above sixty thousand people, from Cherigam to Pondicherry," would not have been passed over without some special notice by Dr Paisley in his letter dated 1774, already quoted, had it occurred prior to that date. The presumption seems to be, that Mons. Sonnerat described invasions of epidemic cholera which took place subsequently to the year 1774. That they were certainly considerably prior to that epidemic, which is stated in the records of the Medical Board to have prevailed "over the whole coast in 1783," is evident from the date of the work; and consequently, when viewed in reference to other authorities, it is obvious that cholera maintained its influence, with little apparent interruption, from a very remote period down to a date comparatively modern. Sonnerat notices the term "mort de chien" as being used in India, but applies it to "indigestions," which "are very frequent," and from which "many have died suddenly."

Cholera observed at Mauritius in 1775, *and in* 1819.—

It appears from the report of a Committee of British medical officers at the Mauritius, which was assembled in the month of November 1819, under the authority of the government, in order to examine into the nature of the epidemic disease which then prevailed at that island, that the epidemic cholera was not unknown there. The following is an extract from the report. "The Committee request to say, that they have not, either in this island, or elsewhere, met with a disease possessing the characters of that which now prevails; but that, from the reports of several individuals, some of whom belong to the medical profession, it does appear that a disease, most strongly resembling in its symptoms, progress, and termination, that now under consideration, did for some time prevail in this colony in the year 1775." The symptoms which are detailed by the Committee, as characterising the epidemic of 1819, sufficiently indicate the identity of that disease with the form of cholera which prevailed at the same period, and still continues, on the continent of India. "The symptoms in the two cases alluded to, perfectly corresponded with those of the numerous instances of the disease which have since occurred. Those more particularly characteristic of the disease are sudden and excessive prostration of strength, with sinking of the pulse, extreme coldness of the surface of the body, which is covered with cold viscid perspiration, and a distressing uneasy sensation in the abdomen, the progress of which has generally carried off the patient in the space of a few hours." Dr Burke, the chief medical officer on the island, makes the following observation in his letter transmitting the report of the Committee. "A similar disease prevailed in this island in 1775, after a long dry season, &c.—the symptoms, fatal and sudden effects, and duration of the disease, would seem to be exactly the same. A hurricane put a stop to its ravages, which continued for probably two months, and caused a great mortality, particularly among the Blacks and people of colour."

But it is necessary to state that a committee of French medical gentlemen, who were assembled under similar circumstances with the British committee, make no mention of the epidemic visitation of 1775.* Assuming, however, the circumstance to be true, it is highly worthy of remark, that while, as we have shown in the preceding pages, the Indian continent suffered under cholera, about that period, viz. 1775, the disease had then also extended to that remote island.

At Ganjam in 1781.—Cholera appears to have manifested itself extensively as an epidemic in 1781; its appearance on this occasion is thus noticed in the report on cholera by Mr Jameson, secretary to the Calcutta medical board:—" A division of Bengal troops, consisting of about 5,000 men, was proceeding, under the command of Colonel Pearse of the artillery, in the spring of 1781, to join Sir Eyre Coote's army on the coast. It would appear that a disease resembling cholera had been prevalent in that part of the country, (the northern Circars), some time before their arrival; and that they got it at Ganjam on the 22d March. It assailed them with almost inconceivable fury. Men previously in perfect health dropt down by dozens;

* The description of the epidemic of 1819, by the French committee, deserves to be inserted. "Ces phénomènes sont une faiblesse subite, avec des tiraillements, ou douleurs dans les muscles des extrémités, qui font chercher un appui pour ne pas tomber; un refroidissement général de toute la surface du corps; une privation absolue du battement du cœur et de toutes les artéries extérieures; une cessation générale de la circulation à la surface, tellement que la ligature placée sur le bras n'a pu faire gonfler les veines, pour y pratiquer une saignée; et que les ventouses scarifiées ont laissé couler un peu de sang, comme s'il sortait d'un vaisseau affaissé, atone, et presque vuide; des évacuations par haut et par bas, séreuses, blanchâtres, muqueuses, rares, se bornant souvent à des efforts de vomissement, et de déjections alunés; les boissons, prises facilement, étaient rarement rejetées.—La face était gripée, sombre, marquant une anxiété intérieure extrème; un decubitus presque immobile sur le dos, ou sur le ventre; les yeux à moitié fermés, le globe relevé sous la paupière; une voix altérée, silencieuse, ou des gémissemens plaintifs.—Les facultés intellectuelles se manifestant par les réponses de oui ou non, sans le désir ni la volonté d'émettre beaucoup de paroles.—Ces malades se soutenant avec peine pour l'emploi des remèdes. Une sueur grasse; la mort sans convulsion, ou agitation, surtout dans les momens où on voulait les remuer."

and those even less severely affected were generally dead or past recovery within less than an hour. The spasms of the extremities and trunk were dreadful; and distressing vomiting and purging were present in all. Besides those who died, above five hundred were admitted into hospital on that day. On the two following days the disease continued unabated, and more than one half of the army was now ill." In a note it is added—"The occurrence of the disease on this occasion is noticed in a letter dated 27th April 1781, from the supreme government to the Court of Directors, and the destruction, which it caused in this detachment, mentioned in terms of becoming regret." After adverting to its progress in the Circars, the letter thus proceeds: "The disease to which we allude, has not been confined to the country near Ganjam. It afterwards found its way to this place (Calcutta); and after chiefly affecting the native inhabitants, so as to occasion a great mortality during the period of a fortnight, it is now generally abated, and pursuing its course to the northward." It would have been interesting to have traced this disease, as it seemed to have put on the epidemical form, but every attempt to discover its further progress has proved fruitless.

Noticed by Curtis in 1782.—From this period up to the year 1787, and perhaps even to 1790, the cholera would appear to have existed epidemically in various parts of India. Curtis states that the fleet in which he served, joined Sir Edward Hughes' squadron at Madras in the beginning of 1782. In May of that year, his ship, the Seahorse, arrived at Trincomalee; and he says—"The mort de chien, or cramp, I was also informed by the attending surgeon, had been very frequent and fatal among the seamen, both at the hospital, and in some of the ships, particularly in the Hero and Superb." The Seahorse had no case of the disease till the 21st of June, when, between that day and the 25th, they had eight cases.

"In every one of the eight cases, the symptoms were so much alike, both in order and degree, that a description of any one would answer almost equally well for every other. Any difference that took place was in the suddenness of the attack, or the rapidity with which the symptoms succeeded each other. In all of them the disease began with a watery purging, attended with some tenesmus, but with little or no griping. This always came on some time in the night, or early towards morning, and continued some hours before any spasms were felt; and slight affections of this kind being very common in the country, the patients seldom mentioned them till they began to be more severe, and extended to the legs or thighs. This purging soon brought on great weakness, coldness of the extremities, and a remarkable paleness, sinking, and lividity of the whole countenance. Some at this period had some nausea and retching to vomit, but brought up nothing bilious. In a short time the spasms began to affect the muscles of the thighs, abdomen, and thorax, and lastly they passed to those of the arms, hands, and fingers; but I never saw, then or afterwards, those of the neck, face, or back at all affected. The rapidity with which these spasms succeeded the first attack, and their severity, especially as affecting the muscles of the thorax and abdomen, denoted in general the degree of danger in the case. The affection is not, as in tetanus, confined to a single muscle, or to a certain class of muscles only. Neither does it, as in the spasmus clonicus, move and agitate the members. It is a fixed cramp in the belly of the muscles, which is gathered up into a hard knot, with excruciating pain. In a minute or two this relaxes, is again renewed, or the affection passes to others, leaving the miserable sufferer hardly an interval of ease; and, lastly, it passes from one set to another, from those of the inferior extremity to those on the upper parts, leaving the former free. The patients complain much of the pain of these cramps; think they obtain some relief from friction of the

parts, and cry to their companions to rub them hard. As the disease proceeded, the countenance became more and more pale, wan, and dejected; the eyes became sunk, hollow, and surrounded with a livid circle. The pulse became more feeble, and sometimes sank so much as not to be felt at the wrist in two or three hours after the spasms came on. But so long as it could be felt, it was but little altered in frequency. If the spasms happened to intermit, it would sometimes rise a little, and the countenance assume a better look. The tongue was generally white, or more or less furred towards the root; the patients had all great thirst, or rather a strong desire for cold drinks; but there was no headach or affection of the sensorium commune throughout."

"The coldness of the extremities, which was perceptible from the very first, continued to increase, and spread over the whole body, but with no *moisture* in the skin, till the severity of the pain and spasms forced out a clammy sweat, which soon became profuse. The hands now began to put on a striking and peculiar appearance. The nails of the fingers became livid, and bent inwards; the skin of the palms became white, bleached, and wrinkled up into folds, as if long soaked in cold water; the effect, no doubt, of the profuse cold sweat, which is one of the most pernicious and fatal symptoms of the disease, both from the effect it has, in such a climate, of exhausting the strength, and in abstracting heat from the system. In some of the present cases, and in many others after this, we had recoveries from the severest degrees of spasmodic affection; even where the pulse had been for hours completely lost at the wrist, and the body perfectly cold; but never of any who had these profuse cold clammy sweats, and where the hands had put on this appearance."

"All this while the purging continued frequent, and exhibited nothing but a thin watery matter or mucus. In many, the stomach became at last so irritable, that nothing

could be got to rest upon it; but everything that was drank was spouted out immediately, without straining or retching. The countenance and extremities became livid, the pulsations of the heart more quick, frequent, and feeble; the breathing began to become laborious and panting; and, in fine, the whole powers of life fell under such a great and speedy collapse, as to be soon beyond the power of recovery. In this progression, the patient remained from three to five or six hours from the accession of the spasms; seldom longer. These began at last to abate, but with more internal oppression, great jactation, panting, and gasping for breath, from the diminished action of the respiratory organs; for there were no marks of oppression or effusion on the lungs, and the motion of the heart, so long as it could be felt, became more and more quick and irregular, till death came at last to the relief of the miserable sufferer. Sometime before that event took place, the spasms gradually abating, left the sufferers entirely; and so much possession of their faculties did they retain, that they would continue to talk sensibly to their messmates, to the last moment of their life, even when the whole body had become perfectly cold, and all pulsation of the heart had ceased for a long time to be distinguishable." "About the middle of July, 1782, I entered on duty at Madras Hospital. Here, again, I had occasion to see many more cases of the mort de chien. It was frequent in the fleet in the month of August and beginning of September, the season at which the land wind prevails on this part of the coast. We had some cases in the hospital in the end of October, and in November, after the monsoon, but few in comparison."

Also by Girdleston.—Although cholera would thus appear to have been of limited prevalence in the Naval hospital of Madras, in October 1782, its influence was most severely felt at that period by the newly arrived troops from England, as stated by Girdleston in his Essay on

Spasmodic Affections of India. He observes—"Spasms were the first disease which appeared amongst the troops who arrived at Madras in October 1782, under the command of Major-general Sir John Burgoyne. More than fifty of these fresh men were killed by them, within the first three days after they were landed in that country; and in less than a month from that time, upwards of a thousand had suffered from attacks of this complaint." "The symptoms which commonly first presented themselves, were coldness of the surface of the body, especially of the hands, feebleness of the pulse, and spasmodic contractions of the lower extremities, soon extending to the muscles of the abdomen, diaphragm, and ribs. As the spasms advanced, the muscles might be seen to assume the rigidity of cartilages; sometimes causing the body to remain immovably extended, sometimes bending the trunk through its whole length anteriorly, and sometimes, though seldomer, backwards. The parts in which the spasms began generally remained rigid; but those which were subsequently seized with them, had momentary intermissions of the contractions—the only intervals of relief experienced by the patient from the most tormenting pains. The hands and feet then generally became sodden with cold sweat, the nails livid, the pulse more feeble and frequent, and the breath so condensed as to be both seen and felt, issuing in a cold stream at a considerable distance. The thirst was insatiable, the tongue whitish, but never dry; vomitings became almost incessant; the spasms, cold sweats, and thirst increased with the vomitings, which last, if not checked, soon terminated the existence of the patient." "In this manner, most commonly was the succession of phenomena; but often they were so rapid in their attack, that they seemed to seize the patient all in conjunction instantaneously."

"In some few the extremities remained warm; in others also the spasms were only clonic or convulsive. Some died in the first hour of the attack; others lived a day or

two with remissions, when they died either of universal spasms or an apoplexy. On dissection of the bodies after death, it appeared that no injury had been sustained by the brain, liver, gall-bladder, stomach, or heart. The prognosis of this disease is formed with greater certainty from the warmth or coldness of the extremities, than from either the universality of the spasms, or the frequency or steadiness of the pulse. Thus, if the spasms were ever so general, with warmth of the extremities, there was no immediate danger: on the contrary, if the spasms were ever so trifling, with coldness, there was every danger to be feared."

Girdleston, like Bontius, treats of the "spasms" as an idiopathic disease; yet it is obvious, from his observations on the prognosis, that spasm was merely a symptom, and one of secondary importance. He has not noticed purging; and, from the casual way in which vomiting is mentioned, it seems doubtful whether we are to consider purging to have been inadvertently omitted, or that it was really not present, as has been often observed to be the case on late occasions. It is accordingly assumed, that the "spasm" described by Girdleston, was in fact the spasmodic cholera, or mort de chien of Curtis. It is also noticed in the Bengal report, that in the month of April 1783, cholera destroyed above 20,000 people, assembled on occasion of a festival at Hurdwar; but it is said not to have extended to the neighbouring country. All these authorities would seem, accordingly, to establish the fact of the prevalence of cholera in India; and especially of its existence during the period extending from 1769-70 to 1787, when we find the first notice of the disease in the records of this office, as given in the extracts, page 239, and which we now come to consider.

At Vellore, in 1787.—Dr Duffin, in a letter dated the 28th October 1787, says—"I returned yesterday from Arcot, where I had an opportunity of seeing the situation of the sick.

The cholera morbus rages with great violence, with every symptom of putrescency, and so rapid in its progress, that many of the men are carried off in twelve hours' illness." Dr Duffin considered the disease to depend on putrid bile; he recommended castor oil, external heat, frictions, and the internal exhibition of warm cordial drinks, as the plan of treatment he had always found successful. In a subsequent letter, dated the 3d November, he enters more fully on the nature of the disease. "The symptoms were generally pretty much the same in all I have seen, only the violence of the spasms was greater according to the stamina of the patient, and the quantity of putrid matter in the primæ viæ. They generally are seized with a nausea, frequent heats and chills, a dryness of the skin, and numbness and uncommon sensation, as they express it, in different parts of their body. Then came on cold sweats, severe gripings, and mostly a purging of bilious colluvies, appearing often in a ferment like yeast, and not unlike it in colour, with a putrid offensive smell; retchings to vomit, often bilious, and at other times scarce anything is brought up, but the liquor that is drank; an intense thirst, oppression on the præcordia, with difficulty of breathing; frequently the spasms begin with the first attack, though sometimes they only appear as the disease advances, and then generally affect the lower extremities, afterwards the abdominal muscles; and the whole system becomes convulsed. The pulse from the first sinks, and at times is scarce to be felt; profuse clammy cold sweats, and a pallid hue overspread the body; the countenance ghastly, the eyes sunk, and the voice scarcely to be heard, with great dejection. The tongue in general moist, till near the close of the disease, when it becomes dry and foul, and the breath offensive; the urine generally pale, and in small quantity."

It is to be observed that Dr Duffin, at the period in question, was stationed at Vellore, about 14 miles from Arcot; and that his description of the cholera could not

be founded on any lengthened observation of the cases at the latter station, since he only made a very short visit to it. There seems some reason to doubt, therefore, whether he was not describing partly what he saw at Arcot, and partly what he had more experience of at Vellore, where the cholera was then also raging, but not in a very dangerous degree. His confident allusion to the bilious nature of the contents of the primæ viæ, and the success of castor oil in curing the disease, may lead us to suppose that at Vellore he had in fact to contend chiefly with the cholera morbus as it is commonly termed, not with the epidemic or spasmodic cholera. This conclusion is supported by a reference to the sick returns, which happen in this instance to be somewhat less meagre and imperfect than they generally are found to be at that distant period.

It appears that, during the month of October 1787, twenty-two Europeans were admitted into hospital with "cholera morbus" at Vellore, and two natives; of whom it cannot be ascertained that any died, for the returns of that period do not show the disease from which the casualties arose; however, only two Europeans died during that month at Vellore, from any disease, and not one native. At Arcot, on the contrary, twenty-five Europeans are entered in the sick returns, under the head of "cholera morbus" in October 1787, but no natives; and twenty-five Europeans died that month—a number which falls short of what Dr Davis distinctly attributes to cholera alone. In November, forty-five Europeans are returned at Vellore, under the head of "cholera morbus," and one native; only one European died that month at Vellore. At Arcot, seventeen Europeans are returned in November, as ill with "cholera morbus:" only one death took place in all, but during this month it seems to have slightly affected the natives, twelve being returned, of whom none died: there were at this time four regiments of native cavalry quartered there. It seems reasonable therefore to infer, that the

disease prevalent at Arcot and described by Mr Davis as "a spasmodic affection of the nervous system," was not the same, in general, with that which existed at Vellore, unless we impute a degree of efficacy to castor oil which can hardly be admitted.

At Arcot in 1787.—Mr Davis, a member of the then Hospital Board, appears to have been deputed from Madras, to investigate the nature of the sickness which prevailed at Arcot. In his report to the Board, which is dated the 29th November 1787, he states as follows. "I found in what was called the epidemic hospital, three different diseases—viz., patients labouring under the cholera morbus; an inflammatory fever, with universal cramps; and a spasmodic affection of the nervous system distinct from the cholera morbus. I understood from the regimental surgeon, *that the last disease had proved fatal to all who had been attacked with it;* and that he had already lost seven-and-twenty men of the regiment in a few days. Five patients were then shown me, with scarce any circulation whatever to be discovered; their eyes much sunk within their orbits; their jaws apparently set, their bodies universally cold, except at the præcordia, and their extremities livid. Mr Pringle observed that these five men were attacked on the 26th October, that Mr Duffin had seen them, and had recommended castor oil to be administered, &c. &c." He then goes on to say—"finding, on the day of their attack, the rectum had discharged its contents in the action of straining to vomit without being able to bring anything up, I directed a stimulant injection to each of these patients, which produced a copious discharge of fæces, without any bilious induration (indication?) whatever." Having prescribed some antispasmodic medicines, he says, "from all which, I had the pleasure to observe, that in four-and-twenty hours after my first visit, the spasms had totally subsided: the patient's voice, which all along had

been so low as scarce to be heard, was returned almost to its natural state; the pulse that was imperceptible, full and even." After ordering some carminative purgatives, he observes, "I attended to the operation of these respective medicines, and could discover no bilious indication in the whole system." Two of the five patients having died in a few minutes after being taken out of a hot medicated bath, "upon dissection the duodenum was found distended with putrid air; the other intestines empty, except the colon and rectum, in which latter there were indurated fæces; the whole viscera sound, the gall bladder turgid, but not diseased."

Mr Davis does not state the symptoms of the "inflammatory fever with violent cramps," farther than that the patient complained of a "tightness of the abdomen with a costive habit." The "cholera morbus" was distinguished by "spasms of the præcordia, and cramps of the extremities, with bilious lientery, and a copious discharge from the stomach of a green, yellow, and dark coloured bile." During his residence at Arcot, upwards of sixty patients labouring under these three forms of disease were admitted, and only two or three deaths ensued. The dissection of a case is given, where, it is stated, "the bladder was most singularly contracted, and did not exceed in size a large nutmeg, yet without inflammation, or any apparent disease, except its contracted state." Mr Thompson, surgeon, who was also sent to Arcot at the same time with Mr Davis, observes, "This disease is exactly the same as prevailed at Trincomalee in the months of April and May 1782, when the season was very hot and chill, the winds blowing from the land, and reaching some leagues to sea. The weather here at present is the same as I experienced at Trincomalee." Mr Thompson also gives an account of a dissection where "the gall-bladder was exceedingly distended with bile, so much so as to appear protruded some inches below the liver, and to contain near six ounces

of bile. No marks of putrescence in any of the abdominal viscera. The urinary bladder quite empty and contracted to the size of a walnut; the stomach and duodenum both empty of bile, and no appearance of inflammation in any part of the intestinal canal or peritoneum."

To persons familiar with the progress of cholera during late years, there can be little difficulty in understanding and reconciling the apparent discordances in the accounts just quoted. Many instances of the common cholera would seem to have occurred at Arcot, as well as at Vellore, where, it has been conjectured, this form of the disease chiefly prevailed. Some cases seem to have commenced with a degree of febrile excitement—an occurrence which has been occasionally observed in the present epidemic; or perhaps these cases might be properly referred to a species of febrile affection with cramps, of which we have a very distinct history by Mr Anderson, who observed the disease at Ellore in 1794, and styled it a "Causus;" lastly, that which Mr Davis characterises as a "spasmodic affection of the nervous system, distinct from cholera morbus," was no doubt the same low and dangerous form of the disease with which we have become too well acquainted in recent times.

The disease would seem to have lost its force at the period when Mr Davis arrived at Arcot; for we find that the five cases of the low form, which he first saw, had lingered from the 26th to the 29th; and few of the subsequent seizures proved fatal, which is quite analogous with our present experience. Whether the bowels were less generally affected in that epidemic, or whether the means employed and the prolongation of life for three days had given rise, in the cases in question, to fæcal formations, and to their accumulation in the large intestines, it is not easy, from the scantiness of our information, to decide. But if any doubt could be entertained of the cases described being cholera, such as we have lately witnessed, the testimony of

Mr Thompson to their identity is conclusive, if we admit that the mort de chien of Curtis, which he states to have prevailed at Trincomalee at the time mentioned by Mr Thompson, was really cholera.

It is stated in the Calcutta report, that "cholera was again very prevalent and destructive in a detachment of Bengal troops marching through the Northern Circars, in the months of March, April, May, and June, of 1790. The disorder was characterised by precisely the same symptoms which marked the late epidemic. It began with violent pain and spasm in the stomach and bowels; which were followed by purging, vomiting, and all the signs of extreme debility."

Noticed by Dr James Johnston.—The next account we have of cholera is to be found in Dr Johnston's work on the diseases of tropical climates. It does not appear, in that work, that cholera was then epidemical; but it would seem to have occurred pretty frequently both on shore and on ship-board, chiefly in the vicinity of Trincomalee. The precise date is not mentioned; it is concluded, however, to have been about 1804. Dr Johnston does not detail the symptoms with much minuteness, contenting himself with those occurring in one or two cases, and referring generally to Curtis's description of the disease—a pretty satisfactory proof that they were the same. A seaman, on awaking after a debauch, repaired to the deck, and there again fell asleep, during the chilly part of the night. "About four o'clock in the morning, he awoke with a shiver, and left the deck, but was soon seized with frequent purging and griping, his stools consisting of mucus and slime. Nausea and retching succeeded; nothing being ejected but phlegm and the contents of the stomach. His pulse was now small, quick, and contracted; his skin dry, but not hot. About eight o'clock in the morning he began to feel spasms in different parts of his body, which soon attacked the abdo-

minal muscles, and threw him into great pain. During these paroxysms, a cold clammy sweat would be occasionally forced out, especially in the face and breast. The extremities now became cold; his features shrunk; the stomach rejecting everything which was offered, either as medicine or drink. The abdomen and epigastrium all this time were distended and tense, with incessant watery purging and painful tenesmus. By ten o'clock his pulse could scarcely be felt; his breathing was oppressed and laborious, his eyes sunk, and the whole countenance singularly expressive of internal agony and distress. The extremities were cold, shrivelled, and covered with clammy sweats. The violence of the spasms now began to relax; and by eleven o'clock, or seven hours from the attack, death released him from his sufferings." "This may serve as a specimen of the worst form of that dreadful disease, which has obtained the appellation of *mort de chien*, or the 'death of a dog.'"

Cholera at various times since 1787.—Since cholera has become familiar to the older practitioners here, many, perhaps all of them, recollect having met with insulated cases of that disease, as well as of sudden, and often fatal illness, which they, at the moment, could not well understand, and which, consequently, proved extremely embarrassing. Such cases would, no doubt, be attributed by different practitioners to different causes, and be referred to different heads of disease, according to the various states in which the patients were seen; and perhaps some of them were considered to have been merely anomalous instances of common cholera; but late experience has now very generally led to the opinion, that they were in fact cases of spasmodic cholera. The records of the Medical Board throw no light on this subject. The number of cases of the description alluded to, which may have entered the military hospitals, could not, however, in all probability, have been great, without attracting observation. It might perhaps be

thought that the necessity of classing the cases in the official returns would have led to their being detected by a bare inspection of these documents; but in the absence of any nosological arrangement, which then distinguished the returns, no difficulty would be experienced in disposing of them. Sporadic cases of spasmodic cholera might naturally produce the impression that some poisonous matter had been swallowed, which other circumstances would contribute to render sufficiently plausible; for it is notorious, that intoxicating liquors are prepared by the natives, and clandestinely sold to the European soldiery, which contain the most deleterious matters, and which often produce fatal consequences to those who drink them. The symptoms attending such cases are frequently very anomalous and perplexing. Although the natives are less prone to debauch in spirituous liquors, they are yet not altogether to be exempted from the reproach; and the notion of a poison having been swallowed, would, in their case, be rendered still more probable from such occurrences not being unknown amongst them, and from our ignorance of the nature of the poisons which are used.

Described by Mr J. Wyllie in 1814.—It must be admitted, however, that very few cases, either of sudden death, or poisoning, or cholera, are to be found in the returns; but it will be presently shown that no positive conclusion can thence be drawn against the existence of spasmodic cholera prior to the year 1818, when it appeared epidemically in the Madras territories; and that some at least of the cases designated as cholera in former times were clearly of the spasmodic species. Mr John Wyllie in his report, dated 20th July 1818, (page 68,) makes the following remarks:—"Before concluding, I think it proper to add, that although I have never, before the late occasion, seen this peculiar disease prevailing as an epidemic, yet I have at various times met with single cases of it in the most aggravated form; and I am much mistaken if I have

not recorded two particular instances of it in my journal of the 1st battalion 24th Regiment for the month of June 1814, under the names of Paramuttee and Madaramooto, sepoys." On referring to these cases, which have been preserved, Mr Wyllie's conjecture seems to be fully confirmed. The first case is thus described:—"Jalnah, 19th June 1814: half-past two, P.M. He is in a state of the most complete exhaustion, unable to move or speak; features contracted; eyes sunk, half open, and of a dull lustre; countenance bedewed with a cold sweat; pulse low, skin cold. Has been vomiting and purging very frequently since seven A.M.; and had all yesterday been affected by a watery diarrhœa." At three P.M., he "is greatly distressed by excruciating crampy pains of the thighs and legs." At nine P.M., "complains of thirst, tongue moist." On the 20th, he "continues very low; countenance still of a ghastly appearance;" alvine discharge copious, alone of ash-coloured slime." The patient recovered. The next case is on the 24th June, seven A.M. "Is in great distress from violent crampy pains of the muscles of the upper and lower extremities, but more particularly of the fingers; there is great prostration of strength; countenance ghastly; surface cold; pulse gone; much thirst. He had a very copious watery purging on him since one o'clock this morning. He attributes his complaints to having slept last night on the damp ground and in the open air while on guard." At nine A.M., "pulse just perceptible:" at two P.M., "slight giddiness, eyes red—says he has much appetite:" at six P.M., "one copious pale watery evacuation." This man also recovered, and both were treated with opium and diffusible stimuli.

Also by Mr Cruikshanks in 1814.—Another incidental notice of cholera has led to the discovery of that disease having prevailed to a remarkable extent, at the same time and much in the same neighbourhood as in the preceding instance. The late Mr J. J. Duncan, in a report dated 1st

September 1819, after making some observations on the comparative advantages of dry and moist heat, externally applied, goes on to say—"In the month of June 1814, when the cholera appeared with great severity in the 1st battalion 9th regiment, N. I., on its march from Jaulnah to Trichinopoly, I employed exactly the same plan of exciting heat, (heated sand,) and found the greatest benefit resulting from it. The disease in the 9th regiment in 1814 resembled in every particular (with the exception of the heat at the præcordia) the cholera at present so common, although it could not be called epidemic. The best behaved, the most robust, and the most active, were attacked and suffered equally as much as any patient I have seen with the epidemic cholera; out of a very considerable number of patients, I only lost one man; the number I could not specify, as I was ordered back to Jalnah on duty about ten days after the appearance of the disease, and before the monthly returns were despatched."

On referring to the returns of that corps it appeared, that in the month of June 1814 ninety-nine cases of "bowel complaint," were entered, of which fourteen proved fatal; and about sixty cases of the same disease were admitted in the succeeding two months, of which, however, very few died. As these returns made no allusion to cholera, and as they were signed by Mr Cruickshanks, a reference was made to him for information respecting the preceding observations of Mr Duncan, which has drawn forth the very valuable report, inserted at page 234 and bearing date 17th June 1823. It now appears, that a brigadè of two battalions of N. I. marched from Jalnah on the 29th May 1814, and that about the 10th or 11th of June a disease broke out in one of the corps, which, there can be no doubt, was the spasmodic cholera. "When taken into hospital," Mr Cruickshanks observes of the first cases he saw, "they exhibited all those symptoms now so well known, of persons labouring under the advanced and fatal stage of epidemic cholera; the

skin cold, and covered with cold perspirations; the extremities shrivelled, cold, and damp; the eyes sunk, fixed, and glassy; and the pulse not to be felt. These persons all died; and I find, on referring to such notes as I have preserved, that, influenced by consideration of the vascular collapse, and total absence of arterial pulsation, I had denominated the disease asphyxia. Many sepoys were brought into hospital in circumstances approaching to those above detailed. Of them, in a considerable proportion, the disease terminated fatally. Thus the cases which I first saw of this malady, in the aged among the camp-followers, differed in no respect from the worst cases of that affection since so well known under the name of spasmodic cholera. That name, however, I did not adopt, neither in my public report nor in the private notes which I took at the time. In this I was chiefly influenced from considering the nature of the matter ejected by vomiting and by stool, which in cholera is said to consist of bile, but which in these cases was aqueous or mucilaginous. Besides it was evident, that the diluent treatment, recommended in cholera, could never be applicable to such a disease as that with which I had to contend. I continued, therefore, to employ in my reports the term "bowel complaint;" both because I found it in the hospital books on joining the corps, and because if it conveyed no very precise idea of the malady which it was meant to designate, it was at least an appellation whence no erroneous impressions could be derived."

This paper by Mr Cruickshanks is of great importance, in as much as it evinces, that cholera did exist to an extent not hitherto suspected to have occurred at so recent a date; and also, that even under these circumstances, no trace of it is found in the public records: for unless we had been guided by the incidental remark of Mr Duncan, made five years after the occurrence, and had most fortunately been able to refer to Mr Cruickshanks, the medical returns of the corps never could have led to a knowledge of it. Hence

as already observed, though cholera very rarely appears in the sick returns of former times, it is by no means to be thence inferred that it did not then exist.

But this paper is also peculiarly valuable, as showing that the cholera assumed, on that occasion, one of those singular and unaccountable features which it has frequently manifested in the present times: for after enumerating various striking atmospherical vicissitudes, change of food, and many other predisposing, remote, and exciting causes of disease, to which the brigade had been exposed, Mr Cruickshank goes on to observe: "To none of these causes of disease which I have enumerated, did the natives themselves attribute the sickness and mortality which prevailed; and on considering that of two battalions composing the brigade, alike exposed to all those causes, *one only* suffered from the epidemic—*the hospital of the 5th N. I. exhibiting not a single case of analogous disease*—those adduced can only be regarded in the light of remote or predisposing causes; while, something or other acting exclusively on one battalion must be sought for as instrumental in exciting the malady." We shall have occasion hereafter to revert to this particular subject; at present it is mentioned as showing that cholera did, even then, manifest one of the most curious of its features—namely, that of two bodies of men, apparently under similar circumstances, one shall be attacked by it, and the other shall escape.

Considered to be endemic in Travancore.—It would also seem, by the subjoined extracts of reports from Mr Staff-surgeon Hay, that cholera, in a form nowise different from the spasmodic or epidemic, is endemial in the Travancore country, and that he regarded the disease which appeared there in October 1818, to be this endemic, rather than the epidemic whose approach from the northward he still contemplated. On the 19th November 1818, Mr Hay writes: "The spasmodic cholera, I am happy to say, abates—the last seven days not having afforded more

than thirty-six cases at Quilon, and there has been no casualty here in that time; but the Vythians* who arrive from the country for instruction and medicines, report the deaths of almost all attacked." After acknowledging the receipt of some medical supplies, he continues: "I trust to be able to make a noble stand against the *epidemic* when it arrives. What I have had to encounter recently I hold to be the *endemic* Veshoo-ugeka, or Neer-comben, if not of the Malabars, certainly of the Travancorians, which is perfectly familiar to all here; committing frequently great mischief, and sometimes (twenty-five years since) desolating the country, Then, thousands are said to have died of it; the Vythians fled from it as a plague; and no one who has not early succour from suitable medicines, is ever known to recover." "The description of the veshoo-ugeka tallies in every particular with that of the spasmodic cholera; and whether the epidemic reaches us or not, the country will have reason to be thankful for instruction and remedies they never might have had, unless the dangerous inroad of the epidemic had been apprehended. In May last at Trevanderau, the capital, one hundred lives were sacrificed to this veshoo-ugeka (poisonous air.) Some of the servants of the palace were seen by Mr Provan's assistants, and saved; but the villagers around, having no assistance, died to a man." Again, on the 24th December 1818, Mr Hay writes: "The neer-comben, which signifies gush of water by stool, the effect of the disease, and its synonyme veshoo-ugeka, or poisonous air, its imputed cause, which are the vulgar and scientific designations of our present spasmodic cholera, has been very prevalent amongst the troops, their families, and followers. In Quilon I have treated upwards of one hundred and twenty under the spasmodic cholera, and of the inhabitants a considerably greater number, with complete success in every case, where application was made within six hours; and hundreds have been saved by the use of the

* Native physicians.

remedies I have distributed throughout the country. This shows unusually, for be it remembered that to the central parts of the Travancore coast, and parts *quite* adjacent, so far as my reports inform me, the *endemic* has been principally confined, and it is of this I speak; but the *epidemic* also now rapidly progresses southward, having already at Cochin yielded Mr Mather some hundreds of patients, and at Aleppy about thirty per diem are taken ill. As it nears us, I become more apprehensive that the mortality will be great; for although medicines, with ample instructions, have been distributed to one hundred and forty Vythians and others in the country, yet from the experience I daily have of their general inattention, I much fear that when the day of visitation and trial arrives, the sick will be found too often left to their fate, altogether unassisted." Mr Hay goes on to state that, in some villages where there was no medical aid, from three or four to ten people were dying daily of the *endemic;* and, talking of the Vythians, he observes—"but when the same malady (spasmodic cholera) was *epidemic* here thirty-four years since, they ran from their charge under the persuasion that the disease was contagious, for many died, and numbers in one family."

There can be no doubt, however, that the disease described here as an endemic was, in fact, the epidemic cholera of other parts; and no particular manifestation of it took place afterwards at Quilon, in regular course from Cochin and Aleppy, as seemed to have been expected by the staff-surgeon, nor, indeed, until July and August following. The progress of cholera as an epidemic along the western coast, however, was much less regular than in other tracts, which may, perhaps, be attributed partly to the geographical peculiarities of that coast, and partly to the disease being in some degree endemic, which would not only accelerate the invasion and march of an epidemic of the same nature, but also render it difficult to fix the precise dates of its appearance. Mr Hay mentions in the first letter, that cholera committed great ravages in the

Travancore country "twenty-five years since," and in the second letter, that "it was epidemic thirty-four years since;" either of these dates, supposing that there was only one visitation meant, would prove the existence of cholera, epidemically, at a period considerably ulterior to 1787, and of course anterior to the instance in the first battalion 9th regiment; and the whole communication shows, that the disease is at no time of rare occurrence in that country. There is a very fatal form of disease also known in Travancore, called "the red eye sickness" by the natives, which is evidently a modification of cholera. Mr Superintending-surgeon Duncan (page 110) also observes: "I find the old inhabitants of Bellary are acquainted with this disease, and inform me that it raged here about thirty years ago with great violence. This was succeeded by a famine for want of inhabitants to cultivate the country."

It would have been highly important and satisfactory could we have ascertained with precision, by a reference to regular returns of sick, to what degree cholera may have prevailed in the army during those periods when, according to the authorities already quoted, it appears to have been raging on the coast; but the records in the Medical Board Office do not reach farther back than 1786, at which time an "Hospital Board" was first constituted. The returns of sick from that period to the year 1802, which, however, are not in any regular series, have been consulted, and it appears, that in 1787, 1788, and 1789, cholera was prevalent. After 1789, few cases occurred; but there is still a considerable fluctuation in the numbers, from year to year, up to 1802, as will be seen in the subjoined note.* The numbers up to 1817 are also given.

*

1787	130	1795	1	1803	45	1811	67
1788	54	1796	6	1804	53	1812	40
1789	34	1797	0	1805	16	1813	45
1790	9	1798	1	1806	55	1814	65
1791	7	1799	0	1807	79	1815	152
1792	0	1800	2	1808	60	1816	189
1793	13	1801	25	1809	57	1817	282
1794	3	1802	8	1810	133		

A cursory inspection of the register of burials which has been kept at St Mary's Church in Fort St George, from so remote a period as the year 1680, affords some grounds for believing that the population of Madras, including the military and seafaring classes, have, at certain periods, suffered much from epidemics: no light, however, is thrown on the nature of the sickness which may have prevailed. Thus, in 1685, the number of funerals was 31, which is about the average of the four previous years; in 1686 there were 57 funerals; in 1687, 93; in 1688, 84; in 1689, 75; after which they gradually diminished to about the former standard. The funerals amounted again to more than the usual number in 1711, being at 92; in 1712, 89; and 1714, 80; in 1755 there appeared to have been much sickness, 101 funerals having then taken place; the numbers increased yearly till 1760, when there were 140. After this they decreased, and continued stationary till 1769, when 148 took place, a great many of which were of seamen, soldiers, and recruits. A most remarkable increase in the mortality is observable at a period when we know cholera prevailed on the coast. Thus, from the year 1770 to 1777, the average number of funerals was about 105 in the year, the population having by this time increased, it is to be supposed. From that period till 1785, the funerals were as follows:—

1778	165	1781	516	1784	250
1779	190	1782	657	1785	99
1780	353	1783	440		

The occasional presence of fleets and armies no doubt contributed to swell the lists of funerals at particular periods; but, on the occasions in question, the mortality extended also to the civil population; and as the instance of the greatest mortality which is recorded took place at a time when we know from other sources cholera prevailed on the coast, there seems ground for inferring that the

same cause probably existed on the other occasions which have been noticed. Though not immediately connected with the subject, we may here be permitted to remark, that the examination of the obituary affords signal proof of an amelioration in the health of seafaring people—the mortality amongst them in remote periods appearing to have been excessive in comparison with that of modern times.

Having, in the preceding desultory remarks, attempted to trace the existence of cholera in India from a very remote period down to that of its epidemic appearance in 1817, sometimes coming as a pestilence upon the land, at others visiting only particular tracts; and having also attempted to show grounds for inferring that we are not acquainted with all the instances of its epidemic visitations, nor by any means aware of the extent of its occasional or sporadic appearances, it only remains to refer the reader to the valuable reports of the Bengal and Bombay Boards for information respecting its late march through the respective territories of those Presidencies; to Mr Orton, for many interesting particulars of its appearance here; and to the narrative at the first page of this report, for an account of its progress through the Madras territories. This narrative has been compiled from official reports; and as it is intended to exhibit the history of the disease as a sort of memoir to the map which is prefixed, it has been as much as possible divested of all medical reasoning. It is not intended to enter into any discussion respecting the forms of cholera, or the diseases supposed to have been cholera, which may be thought to be described by European writers of ancient and modern times, as having prevailed in Europe.

Nosological remarks.—Cholera has generally been classed by nosologists under the head of Fluxus; but Cullen, though retaining the name, which he understands to signify "a flux of bile," and defining the disease to be so, or

of "a bilious humour," places it in his class Neuroses, and constitutes it a genus of the order Spasmi. Dr Good, in his late valuable work, *The Study of Medicine*, retains the generic term Cholera, which he justifies on the ground that the "bile is morbidly affected in its secretion, either in quantity or quality;" and he places it in the class Cæliaca, or diseases of the digestive function, and in the order Enterica, or diseases affecting the alimentary canal.

Names given to Cholera by the Hindoos.—The quotations which have been given from Hindoo writings show, that cholera, or at least two diseases resembling it, are also there classed, either under the head of nervous diseases, or of disorders of the digestive organs. The native practitioners know the disease by the name of vishuchi or vishuchiki; but the people in general designate it only by two words, signifying in their respective languages, *vomiting and purging*. The term "neer-comben," mentioned by Mr Hay as being in use with the natives of Travancore to express the disease, does not appear to be known to the natives of the Coromandel coast. The word mordixim, mentioned by several modern authorities, is incidentally introduced by Bontius in his description of the hog stone, who says, that "it (the hog stone) is infused in wine for the *cholera*, which the islanders (Malays) call mordexi." Sonnerat has been accused of translating or transforming this word into mort de chien; but, independently of there being no such phrase in the French language, it is manifest, from the quotations already given, that mort de chien was in current use among our soldiers and sailors at the time Sonnerat wrote his book: he does not apply it indeed to cholera, but to an indigestion or colic, in which sense it is in current use with the Portuguese at this day. A learned critique is given in the Bombay reports on the origin of the term mordexim, which is there derived from the Sanscrit If this be true, the corruption of the Sanscrit would seem

to be of Portuguese origin, and the word being spelt with an *x*, pronounced in that language as *sh*, and the final *m* pronounced as the French *in*, we have the word mordeshim or *mordesheĕng*, whence our English corruption mort de chien ; for, as already observed, it is not a French phrase. In Vieyra's Portuguese Dictionary we find the following words, "Mordexim, (among the Indians,) a sort of colic ;" "Mordixim, a sort of sea-fish ;" and in Chambers' *Dictionary of Arts and Sciences* there is "Mordixym or Mordoxi, a name given to a disease very frequent among the inhabitants of Goa, which consists in a nausea and continued vomiting ; it usually seizes the patients suddenly and unexpectedly, and often proves fatal." The word, however originally derived, is now incorporated with the Portuguese language, and is used to signify a severe colic. Is it allowable to infer that the Malays, and other inhabitants of the Eastern isles, adopted it from the Portuguese during their sway in that part of the world ?

Generic name.—The generic term, cholera, being consecrated by universal and almost immemorial use, it would not, perhaps, be proper to reject it, even could we propose another demonstrably better, or prove satisfactorily that bile, either in its quantity or quality, has no connexion whatever with the cause of the disease ; but the specific terms may admit of some observations. We have had no other method in this country of distinguishing between the two forms of the disease, than by retaining the old, and, according to Dr Good, the pleonastic appellation of *cholera morbus*—signifying that form wherein bile appears early, or from the first, in the discharges from the alimentary canal, and in which the circulation is not remarkably depressed ; and by applying the adjuncts *spasmodica* or *epidemica* to the second, or that form wherein bile, in common with the other glandular secretions, disappears, and where the pulse sinks, or ceases to be felt. Dr Good has another species.

styled cholera flatulenta, which, however, it is not necessary to notice here.

Specific names.—The adoption of Dr Good's specific term, cholera biliosa, instead of cholera morbus, will obviate difficulty and confusion; for bile is one of the most easily detected, and perhaps one of the most constant of the diagnostic signs of that form of cholera: but it is only in this sense, as a *symptom* or *appearance* of the disease, and in no wise connected with it as a cause, that the name is admitted. But if morbus added to cholera be indeed a pleonasm, is not biliosa added to it, as is done by Dr Good, also one; seeing that the generic term, cholera, is expressly adopted by Dr Good because *bile* is made to be, "either in its quantity or quality," the cause of the disease? The specific term, spasmodic, applied to the Indian cholera, has met with very serious opposition; for, if restricted to the affection of the muscles of voluntary motion, it implies a symptom of very minor importance, which, in a great proportion of cases, indeed, does not at all occur; and of which the existence in other parts of the system cannot by any means be held as incontestibly proved. The term "cholera epidemica" is that which has been chiefly used of late, especially in official papers, and hitherto it has been sufficiently understood; but it is obviously adapted for temporary application only. It may therefore be allowable to substitute a term which, it will be attempted to show, imports an unfailing diagnostic of this species of cholera—namely the *sinking* or *arrest* of the circulation; and, accordingly, to call it cholera asphyxia, using the word asphyxia only in its restricted sense, that is the stoppage or suppression of the *pulse*.

This proposed specific term, asphyxia, will, it is presumed, designate the disease unerringly; for, as far as our knowledge of it, either from history or observation hitherto, extends, there appears to be in all cases an evident tendency to a sinking of the circulation, an apparent arrest of it in the

vessels of the extremities, if we may judge from the absence of pulse, and from the effect of venesection, in every instance where the complaint is not early cut short by art; and, especially, an arrest of it in every vessel, accessible to the senses, in all fatal cases, at a period before death comparatively more remote than is known in any other disease. The term asphyxia appears to have also occurred to Mr Cruickshank in 1814, as applicable to the disease since known as the spasmodic or epidemic cholera, though he did not propose to use it as an adjunctive, or specific term for cholera, but in a generic sense. The coincidence is still felt, however, to be confirmatory of the propriety of the appellation of cholera asphyxia, which was adopted in this report, long prior to the receipt of his communication bearing date the 24th July 1823. In the following remarks, accordingly, the term cholera biliosa will be used in speaking of the common form of the disease, or cholera morbus; and cholera asphyxia, or simply cholera, in speaking of that epidemic which forms the immediate subject of this report.

Description of Cholera.—The symptoms of cholera asphyxia can hardly be better detailed than they are by several of the older authorities, whose descriptions of the disease have been quoted; or than in many of the original papers which constitute the chief value of this work. The descriptions given in Mr Jameson's and Mr Orton's publications are likewise of the highest value; and little more is left to be desired on that head, than a few brief and supplementary observations.

This most formidable disease does not appear to be attended by any premonitory symptoms which can be regarded as being at all peculiar to it: on the contrary, we may safely assert, that it is of sudden invasion; for, though a slight nausea, a laxity of the bowels, and a general feeling of indisposition are often found to precede cholera, yet these symptoms are evidently common to many other diseases;

and they are especially frequent in this climate, without being followed by any graver ailment. When such symptoms are found to precede cholera, they might with more truth be regarded as indicating merely a certain deranged state of the alimentary organs—a condition of the body which certainly predisposes a person to an attack of cholera.

The invasion of cholera generally takes place in the night, or towards morning. The patient is sick at stomach, he vomits its contents, and his bowels are at the same time evacuated. This evacuation is of a nature quite peculiar to the disease—the entire intestinal tube seems to be at once emptied of its fæcal or solid matters—and an indescribable, but most subduing feeling of exhaustion, sinking, and emptiness is produced. Faintness supervenes, the skin becomes cold, and there is frequently giddiness and ringing in the ears. The powers of locomotion are generally soon arrested; spasmodic contractions, or twitchings of the muscles of the fingers and toes are felt; and these affections gradually extend along the limbs to the trunk of the body. They partake both of the clonic and tonic spasm, but the clonic form chiefly prevails. The pulse, from the first, is small, weak, and accelerated; and, after a certain interval, but especially on the accession of spasms, or of severe vomiting, it sinks suddenly, so as to be speedily lost in all the external parts. The skin, which, from the commencement of the disease, is below the natural temperature, becomes colder and colder. It is very rarely dry, generally covered with a profuse cold sweat, or with a clammy moisture. In Europeans, it often partially assumes a livid hue; the whole surface appears collapsed, the lips become blue, the nails present a similar tint, and the skin of the feet and hands becomes much corrugated, and exhibits a sodden appearance. In this state the skin is insensible even to the action of chemical agents; yet the patient generally complains of oppressive heat on the surface, and wishes to throw off the bed-clothes. The eyes sink in their

orbits, which are surrounded by a livid circle—the corneæ become flaccid, the conjunctiva is frequently suffused with blood, the features of the face collapse, and the whole countenance assumes a cadaverous aspect, strikingly characteristic of the disease. There is, almost always, urgent thirst and desire for cold drinks, although the mouth be not usually parched. The tongue is moist, whitish, and cold. A distressing sense of pain and of burning heat at the epigastrium are common. Little or no urine, bile, or saliva is secreted. The voice becomes feeble, hollow, and unnatural. The respiration is oppressed, generally slow, and the breath is deficient in heat.

During the progress of these symptoms, the alimentary canal is very variously affected. After the first discharges by vomiting and purging, however severe these symptoms may be, the matter evacuated is always watery, and, in a great proportion of cases, it is colourless, inodorous, and often homogeneous. In some it is turbid, resembling muddy water; in others, it is of a yellowish or greenish hue. A very common appearance is that which has been emphatically called the "conjee, or rice-water stools"—an appearance produced by numerous mucous flakes floating in the watery or serous part of the evacuation. The discharges from the stomach, and those from the bowels, do not appear to differ, except in the former being mixed with the *ingesta.* Neither the vomiting nor the purging are symptoms of long continuance. They are either obviated by art, or the body becomes unable to perform these violent actions; and they, together with the spasms, generally disappear a considerable time before death. If blood be drawn, it is always dark, or almost black, very thick, ropy, and generally of slow and difficult effusion. Towards the close of the attack, jactation comes on, with evident internal anxiety and distress; and death takes place, often in ten or twelve, generally within eighteen or twenty, hours from the commencement of the attack.

During all this mortal struggle and commotion in the body, the mind remains clear, and its functions undisturbed almost to the last moment of existence. The patient, though sunk and overwhelmed, listless, averse to speak, and impatient of disturbance, still retains the power of thinking, and of expressing his thoughts, as long as his organs are obedient to his will. Such is the most ordinary course of cholera asphyxia, when its tendency to death is not checked by art. A favourable issue is denoted by a rising of the pulse, a return of heat to the surface, inclination to natural sleep, and a diminution or cessation of vomiting, purging, and spasms; these indications being succeeded, after an interval, by the re-appearance of fæcal matter in the stools, of bile, of urine, and of saliva.

Varieties in the general features of Cholera.—Cholera, like other diseases, has presented considerable variety of symptoms; but, before we proceed to notice its more striking varieties, it is necessary to advert to one feature, which, though not altogether unobserved in other epidemics, may still perhaps be regarded as especially distinguishing cholera —namely, that these varieties are not observable so much in *individual* cases, as in what may be termed *local epidemic visitations*. Thus, when the disease appears epidemically in a town or district, or in the lines of a corps or the camp of a marching regiment, it may on one occasion be distinguished throughout by the absence of vomiting, and the prevalence of purging; on another, by the excess of vomiting, and, though more rarely, by the absence of purging. Spasm may be generally present in one instance of invasion; in another it may not be distinguishable. A frequent variety—the worst of all—is that which is noted for the very slight commotion in the system; in which there is no vomiting, hardly any purging, perhaps only one or two loose stools, no perceptible spasm, no pain of any kind, a mortal coldness, with arrest of the circulation, comes on from the beginning, and the patient

dies without a struggle. This has frequently manifested itself as the prevailing type, and almost all die who are attacked by it; but fortunately it has not usually lasted long, the disease either disappearing, or assuming, during its further progress, a milder or less formidable character.

It would be highly important, in a pathological view, could we trace these leading distinctions in the disease to any particular state of the weather, to any local peculiarity, or to any circumstance affecting the food, shelter, or occupation of the people who may be the subjects of it; but it must be confessed that this is far from being practicable. It appears, on the contrary, to be established that, under circumstances apparently similar in all respects, these modifications of the disease have been found equally to prevail. On the other hand, it may be assumed that a person, in proportion to the vigour of his constitution and to the unimpaired state of his health, is less liable to be affected with the low form of the disease.

And, in particular symptoms:—Vomiting.—Vomiting is a prominent symptom of cholera; but there are numerous instances on record where it has been entirely absent. In certain epidemic visitations even, scarcely an individual case has manifested this symptom. In some cases, the stomach appears to be freely and perfectly emptied, prodigious quantities of watery fluid being ejected, occasionally with great force. This fluid sometimes resembles what is discharged in pyrosis; at other times it is glairy and ropy. In other cases, the stomach seems to have lost the power of freely ejecting its contents; there is an ineffectual straining to vomit, and a spouting up of any fluid which is swallowed, as if by an effort of the lower part of the œsophagus rather than of the stomach itself. When full vomiting in these cases has been effected by medicine, relief follows; not however, in all probability, by the mere evacuation of the gastric contents, but as a consequence of

that change in the condition of the patient, which must necessarily be established before the stomach can resume the action of vomiting. Vomiting is sometimes altogether absent; or, if it has been present, soon ceases, from an atonic state of the stomach, under which that organ receives and retains whatever may be poured into it, as if it were really a dead substance. This is a most alarming state, in comparison with which the utmost irritability, or almost any other imaginable condition of the part, may be held to be of little danger.

It is not always easy or possible to ascertain what substance imparts the greenish or yellowish hues to the fluids ejected by vomiting; but it is perhaps too readily admitted that these colours are owing to the admixture of bile. A regular series of experiments regarding the effects of chemical agents on the gastric and intestinal secretions, and on the matters discharged in cholera, and in other diseases, is certainly a desideratum. The Medical Board have addressed a circular letter to several of their officers on this subject, which it is hoped will ultimately be the means of drawing forth some precise information.*

* On mixing twenty grains of calomel with an ounce of ox-bile, which was previously of a "grass-green colour," the bile assumed the hue of "pea-green." This hue was rendered more intense by the application of heat, and took on a tinge of yellow. After standing twenty-four hours, the mixture was of "a dark or sap green." The calomel appeared at the bottom like "blue ointment," and was "unctuous" to the feel. On mixing forty grains of calomel with an ounce of ox-bile, previously of a "light-brown colour with a shade of green," the mixture assumed the colour of "ochre." After standing, it assumed a "grass-green colour." The calomel was discoloured in a less degree than in the former experiment. On mixing fifteen grains of calomel with six drachms of sheep's bile, which was of a "dark-brown colour with a shade of green," the mixture put on a "light pea-green with a tinge of yellow." On subsidence of the calomel, which was apparently unchanged, the bile appeared of a "rich dark-green colour." On mixing forty grains calomel with two drachms of goat's bile, which was of a "dark-green colour," no change of colour took place.

On mixing four drachms of ox-bile of a "light-brown colour" with an equal quantity of liquor ammonia, the mixture assumed the colour of Madeira wine. Equal parts of sheep's bile and liquor ammonia being mixed, the fluid became of a light yellow colour. The bile was previously of a deep yellow.

On mixing equal parts of sulphuric æther and ox-bile, which was previously of a "pea-green colour," the fluids did not unite. The æther got a "yellow tint, and became of a yellowish hue."

Supposing, however, that either the yellow or green hue of the matter vomited in cholera indicates the presence of bile, it is undoubtedly of rare occurrence, especially during the acute stage of the disease. It would appear, nevertheless, that apparently bilious matters have been vomited, particularly at the beginning, and towards the favourable termination of the disease, and even in cases which have ended fatally. The mere presence of bile in the discharges cannot, therefore, be held as decisive against the disease being the cholera, of which we are treating. Worms, especially the lumbricus teres, have been very generally ejected by vomiting; and several medical officers have noticed that this symptom has even indicated a less dangerous form of the disease. If there be any truth in the observation, it is probably referable to the *free* action of vomiting, which brings up these animals—this being in itself a favourable symptom.

Purging.—Purging is a more constant symptom of cholera than vomiting; and, in a majority of cases, it is the first in the order of occurrence: but, being a less striking deviation from a state of health than vomiting, which instantly arrests the attention, it has usually been treated of in succession to it. This symptom has very rarely been altogether absent; but there seems no reason to doubt that this is sometimes the case. Its absence appears, indeed, to denote a peculiar degree of malignancy in the attack. The accounts given by the patients, however, in respect to their alvine evacuations, are not to be implicitly believed. Their attention is not always drawn to the nature of the discharge, and they are apt to convey very erroneous notions on the subject to the medical attendant. In cases where little or no purging has taken place during life, the intestines have yet been found, after death, to be filled with the conjee-like matter, as if they had wanted energy to throw it off, or as if a stricture had been formed on the lower por-

tions of the gut. The intestinal canal appears to be subject, indeed, to the same influences, and its contents appear to vary, as has been stated to be the case with the stomach—with this exception, that it seems always to have the power of emptying itself of its *natural* contents at the commencement, or during the progress of the disorder. This inference is drawn from the accounts of dissections; for we find no instance recorded of fæces remaining, unless in very protracted cases, when the primary disease has been overcome. The dejections are sometimes made without effort or uneasiness; at others, they are thrown out with great force, which has been compared to the squirt of a syringe. They also sometimes take place simultaneously with vomiting, spasm, and stoppage of the pulse, as if all these affections originated, at the instant, from one common cause. There is seldom much griping or tenesmus, although the calls are very sudden, and are irresistible. Pain on pressure of the abdomen is only occasionally noticed. In advanced stages of the disease purging generally ceases; but, in many cases, a flow of watery fluid from the rectum takes place on any change of position. The matters evacuated, after the first emptying of the bowels, have been occasionally observed to be greenish or yellowish, turbid, of a frothy appearance like yeast, and sometimes bloody. In some cases they are inodorous, in others they have a rank fleshy smell. In one fatal case, pure bile, it is said, was discharged. Perhaps much of this variety may depend on the previous state of the large intestine, especially in Europeans, who so generally labour under a morbid condition of that organ; but by far the most common appearance is that of pure serum, so thin and colourless as not to leave a stain on the patient's linen. The next in order of frequency is the conjee or rice-water-like fluid; the mucus is at times so thoroughly mixed, however, with serum, as to give the whole the appearance of milk or chyle. The evacuations have also been observed to resemble

soogee * in colour and consistence; and these cases were mild. Worms are very commonly discharged by stool. The reappearance of fæcal matter, especially if tinged with bile, seldom, perhaps never, takes place till the disease has been subdued. The quantity of the clear watery fluid, which is sometimes discharged, is exceedingly great; and, were it uniform, it might afford us an easy solution of the debility, thirst, thickness of the blood, and other symptoms,—but it is unquestionable that the most fatal and rapid cases are by no means those which are distinguished by excessive discharges. We have innumerable instances, on the contrary, of death ensuing after one or two watery stools, without the development of any other symptom affecting the natural functions. Even collapse has come on before any evacuation by stool had taken place.

Animal functions.—Though the animal functions necessarily partake of that disorder of the vital and natural functions, which very strikingly characterises cholera, yet this participation is not so immediate as we might, *a priori*, be led to expect. The undisturbed state of the mind has been the subject of general remark; but it cannot be matter of surprise should some exceptions occur, from a fortuitous morbid affection of the brain following a state of sanguineous congestion. There is reason to believe that the simple congestion observed in cholera has not been the cause of the coma or insensibility which have been remarked; and when we recollect that almost all practitioners advert to the great reluctance of the patient to be aroused, we must admit that cases of imputed coma may have often been referable to this condition, which have yet been reported as arising from physical disability. Instances are not wanting of patients being able to walk, and to perform many of their usual avocations, even after the circulation has been so much arrested that the pulse has not been

* Soogee is boiled wheaten flour.

discernible at the wrist. Much seems to depend on the constitutional strength and firmness of mind in the patient, and on the form in which the disease has made its attack. The cases here alluded to are those chiefly in which it has begun by an insidious watery purging; and many lives have been lost in consequence of the patients, under these fallacious appearances, not taking timely alarm, and applying for aid. In other cases, again, the animal functions appear to have been early impaired, and the prostration of strength to have preceded most of the other symptoms.

Spasm.—Spasm has been held to be so essential a feature of that species of cholera of which we are treating as to confer on it a specific name. In so far, however, as relates to the muscles of voluntary motion—and it is that description of spasm only which we mean here to treat—no symptom is more frequently wanting. Spasm of the muscles chiefly accompany those cases in which there is a sensible and violent commotion in the system. Hence they are more frequently found in European than in native patients, and in the robust of either, than in the weakly. In the low and most dangerous form of cholera, whether in European or native cases, spasm is generally wanting, or is present in a very slight degree. The muscles most commonly affected are those of the toes and feet and calves of the legs; next to them, the corresponding muscles of the superior extremities; then those of the thighs and arms; and, lastly, those of the trunk, producing various distressing sensations to the patient. Amongst these hiccup is not unfrequent; but it has been observed that this symptom, in cholera, is not at all indicative of danger. The muscles of the eyeballs have not been observed to be affected with spasm, unless the sinking of these organs in their orbits may be considered to be an effect of it. The reports make frequent mention of a remarkable permanent

contraction of the muscles of the abdomen, by which the belly is drawn towards the spine. The spasms attending cholera are of a mixed nature, not strictly clonic; the relaxations being less prompt and frequent than in epilepsy or convulsion, and seldom durable as in tetanus. The contractions of the muscles are invariably attended with pain, and some medical officers have observed that a degree of spasmodic stiffness has continued for several days afterwards. It has also been remarked that spasmodic twitchings of the muscles have taken place after death, and have continued for a considerable time. In one case, where a man had been paralytic in his limbs, with a total numbness of them, they were severely affected with spasms, and became exquisitely sensible. There seems, occasionally, to have been some degree of inaccuracy in the descriptions given of the spasms arising in cholera; and that neuralgic affections of the hands and feet, which are common in other disordered states of the digestive organs, have been confounded with spasms.

Collapse.—Of all the symptoms of cholera, none is so invariably present, none indeed so truly essential and diagnostic, as the immediate sinking of the circulation. It must nevertheless be admitted that, where instant remedial measures have been successfully practised, this symptom may not have developed itself; and that there are even cases where an excited vascular action has been observed to accompany the first movements of the system in cholera. Some intelligent practitioners have entertained doubts whether such cases belong indeed to this disease; and there seems reason to imagine that those inflammatory affections with spasm known in this country, and alluded to in several reports, may, in some instances, have been mistaken for it. It is farther to be remembered that these are precisely the cases which yield most certainly and readily to our remedial means; and it consequently follows that a medical man

can seldom have the opportunity of observing whether or not this form of cholera will degenerate into the low stage. There is, however, direct evidence in support of the fact that they have so degenerated, and gone on to a fatal termination. In the case of soldiers, too, in whom such symptoms have chiefly appeared, we must make some account of the quantity of spirits usually drunk by them at the commencement of the disease, producing an effect on the circulation. The period at which a marked diminution of vascular action takes place is somewhat various. The pulse sometimes keeps up tolerably for several hours, though very rarely: it more generally becomes small and accelerated at an early stage, and, on the accession of spasm or vomiting, suddenly ceases to be distinguishable in the extremities. The length of time during which a patient will sometimes live in a pulseless state is extraordinary. Dr Kellett relates a case where the pulse was gone within three hours from the attack; yet the man lived in that state from the 3d October at 4 P.M., to the 6th at 2 P.M. On the cessation of the spasm or vomiting, and sometimes apparently from the exhibition of remedies, the pulse will return to the extremities for a short time, and again it will cease. The superficial veins and arteries are not always collapsed, even when the pulse has ceased. If these vessels be opened in this condition, the contained blood flows out; their walls then collapse, and no more blood can be extracted. There is no authenticated fatal instance of cholera on record where the circulation has not been arrested, in the extremities at least, long before death took place. The only apparent exception to this conclusion would not have been deemed deserving of particular attention, were it not that, in the faithfulness of record which, it is hoped, distinguishes this report, nothing purporting to be a medical fact or observation is omitted: the case is this,—"Scarcely any disease occurred on the march, with the exception of a few cases of cholera. Of these, a havildar

and sepoy died, and several followers, who seldom were reported in time to receive any aid. One of the last class, a fine young stout man, a bullock-driver, was brought to hospital almost in the last agony: I mention this case from the peculiarity of the patient's skin being hot and dry, and his pulse being about 120, full and strong, until the last moment,—circumstances I had never seen before; while the peculiar appearance of the eyes, and the collapsed features, together with the description given of the attack, and progress of the disease, left me no room to doubt its being genuine. 1st July 1821." The writer of the preceding extract notices the case for its singularity; and, in judging of its identity with cholera asphyxia, we must allow due weight to the circumstance of his attention being thus excited. He acknowledges, however, that the patient was brought to him in the last agony, and draws his conclusions from the reports of the manner of attack and progress of the disease, and from the appearance of the features of the face. We are left to conjecture as to the former of his grounds of belief; and shall, therefore, only hint at the possibility of coup-de-soleil having been mistaken, *on description*, for cholera; but the sudden collapse of the countenance which takes place in cholera seems hardly reconcilable with any condition of body in which the skin is dry and warm, and the *pulse full and strong!* That peculiar state of countenance is manifestly the result of the retrocession of the blood from the surface, and it is quite distinct from the wasting of the solid parts from disease or inanition. That a case of cholera may terminate in death, and the pulse remain *at* 120 *full and strong* to the last moment, is not physically impossible, although at present standing single on the records: but when supported by hearsay evidence, and by an observation which, it has been attempted to show, is not tenable, we may be allowed to regard it as one of those *facts* alluded to in the beginning; and, being palpably at variance with general expe-

rience, it is to be weighed with much caution and circumspection, if not totally rejected.

Thirst, and sense of heat in the epigastrium.—Thirst and a sense of heat or burning in the region of the stomach are generally connected together, and form very prominent and constant symptoms of cholera; yet not only in individuals, but even in epidemic invasions, these symptoms have often been altogether wanting. Even when they are present in the highest degree, the mouth is not often parched, nor the tongue often dry,—on the contrary, there seems in general no want of moisture; and while, as Mr Jameson observes, "all is burning within," these surfaces are cold and blanched. At times, however, the mouth is parched, and the tongue dry and furred; but practitioners seem doubtful whether any practical inference is thence to be drawn. What would be the state of these parts if calomel, ardent spirits, laudanum, and spices, were as largely employed in health, or in many common diseases, as in cholera, with as scanty a use of diluents? Might we not perhaps say that a parched mouth and furred tongue, following the exhibition of such remedies in cholera, is rather favourable than otherwise, as indicating an action counter to that of the disease? When thirst *is* present, it seems to subdue all other feelings; and the ignorant soldier, as well as the medical man, who firmly believes that cold water is almost certain death, alike eagerly seek and swallow it. Two melancholy instances are recited, where medical officers have exerted their last and utmost efforts to reach unperceived even the water of the bathing-tub,—so intolerable are the pangs of this cruel thirst.

State of the skin.—The state of the skin in cholera is, in general, what we might expect to find it in patients labouring under such affections of the alimentary canal, and with the subdued circulation which takes place in that disease.

It is cold, generally clammy, and often covered with profuse cold sweats. Nevertheless, varieties occur in this as in the other symptoms of cholera. The skin is sometimes observed to be dry, though cold, and sometimes of natural—nay, in some rare instances, of preternatural warmth. An increase of temperature has been repeatedly observed to take place just before death ; but the development of heat appears to be confined then to the trunk and head ; and in almost all cases this *partial* development of heat is found to be a fatal symptom. It is entirely unconnected with any restoration of the energy of the arterial system, or any improvement in the function of respiration. The heat, in such instances, has been observed to continue considerable for some hours after death.

The sensation imparted by touching the skin of a person ill with cholera is very peculiar, and reminds one of that imparted by a dead body. The skin, when much collapsed, becomes insensible even to the action of chemical agents, and hence the usual vesicatories fail in producing any effect. The application of mineral acids and of boiling water, in this condition of the skin, produces little or no effect, and some patients are said not to have been sensible of the operation. The action of mineral acids on the skin is not, however, vesication, but rather that of a cautery ; the cuticle, and the extremities of the subjacent vessels, appearing to be destroyed by them. It has been said that vesication could not be produced in some stages of cholera, because the production of serum was, in common with the glandular secretions, arrested ; but when we reflect on the readiness with which serous fluids are poured out in that disease, we shall be rather disposed to refer the failure in the action of vesicatories, even of hot water, to the diminution or destruction of the nervous energy of the skin. It is certain that, in a body *but just dead*, the application of boiling water will vesicate readily ; and if the accuracy of the observation respecting its non-vesicating power in

advanced stages of cholera be established, we must infer that there is less vitality in the skin in such cases, the patient being still alive, than in that of a body *recently* dead of some other disease.

At a very early stage in cholera, leeches can procure little or no blood from the skin. This fact is noticed by some in another sense, as if these animals turned in abhorrence from the skin of a person ill with cholera. When the sweat is thin, it is usually poured out, in large quantity, from the whole surface of the body; but when thick or clammy it is more partial, and generally confined to the trunk and head. The action of the vapour, and hot baths, seem unquestionably to increase the exudation, or secretion from the skin; and the application of dry heat, as the natural temperature of the skin augments, appears to restrain these discharges—circumstances not very compatible with the supposition of a state of spasm of the vessels of the skin. The perspiration or moisture is often free from odour; at other times it has a fetid, sour, or earthy smell, which has been said to be peculiarly disagreeable, and to "hang long about the nostrils" of the by-stander.

Countenance.—That remarkable shrinking of the features of the face, which has acquired the emphatic term of the "true cholera countenance," appears in every case not quickly cut short by medicine; but the degree in which this symptom may be present will be differently estimated, according to the natural contour of the patient's features. This expression of countenance, which conveys too truly that of death itself, cannot be mistaken; and, by an attentive observation, it will be perceived that a similar shrinking takes place throughout the limbs, and all projecting parts of the body. The eyes not only become dim, and the corneæ flaccid, but there appears to be an actual formation of a substance like a film, or membrane, in many cases—showing that this species of surface still possesses secreting powers. The

abdomen has sometimes been observed to be tumid, but more frequently drawn towards the spine. The general apparent reduction of bulk cannot, however, be considered as proportionate to the volume of fluids thrown out; nor, indeed, to depend essentially on that circumstance, as it occurs equally under the most moderate discharges.

Respiration.—Respiration is not usually interrupted in the early stages of cholera, unless from a peculiarity in the mode of attack, under which spasm seizes the muscles subservient to that function. In many cases terminating in death, respiration has gone on in its mechanical part, with little or no interruption, except that it becomes slower and slower; and an instance has been recorded where this function was performed only seven times in the minute. Numerous cases, on the other hand, are noticed—especially in Europeans—where the interruption of respiration was most distressing, and could only be compared to the most violent attacks of asthma. Although the breath is stated in many of the reports to have been deficient in heat, it is not clear that this was a general symptom; nor is it understood that this coldness was more particularly observed in cases of difficult and laborious respiration, than in those where this function seemed to be, at least, mechanically performed without interruption.

Jactation.—With respect to restlessness, or jactation, it is more common with Europeans than with natives. In cases of such sudden and dangerous illness, we must make some allowance for moral as well as physical disquietude; and it is certain that, in very many cases, death approaches while the patient lies in the most complete tranquillity. When much restlessness prevails, it is probably connected with some great oppression of particular organs; and though the absence of this symptom is not, in itself, to be depended upon as affording grounds for a favourable prognosis, its

presence is always highly alarming. The voice, in general, partakes of the debility prevailing in other functions, and is usually noticed as being feeble, often almost inaudible; yet instances are not wanting where the voice has continued of natural strength almost to the last moment.

Functions of the sensorium.—In a disease so highly congestive as cholera, where vertigo, deafness, and ringing in the ears often prevail, and where very large quantities of opium and intoxicating matters have been swallowed, it is truly surprising that the functions of the sensorium are so very rarely disturbed. It seems probable that it is, in many instances, from an inaccuracy of language that coma has been represented as a symptom of cholera; for we find that a patient, who has just been represented to be in a *comatose* state, can with more or less facility be roused from it: and though he cannot overcome that retirement within himself which constitutes so remarkable a feature of the disease, he will yet evince, by the clearness and precision of his answers, that his intellect is not destroyed. The same appearance takes place in tetanus, hydrophobia, and other diseases referred to the class of neuroses. This circumstance shows their affinity with each other, and is calculated to make us pause in receiving doctrines as true, which impute such disorders to depraved functions of the nerves, whose origin, the sensorium commune, nevertheless, remains comparatively undisturbed. Coma must, however, be admitted occasionally to occur, especially towards the termination of the case, when it is fatal; but delirium has seldom or never been observed, unless as a sequel of cholera, when other and foreign morbid actions have been established. That degree of incoherence which has accompanied the excessive spasmodic affections of the muscles, or which has followed the free use of opium and spirits, is not considered as an exception to this remark. Syncope is not a common symptom in cholera, and when it has occurred, unless after venesec-

tion, it has generally been on the invasion of the disease. During the progress of this disorder, when the nervous energy seems to be almost annihilated, and the functions of the heart and arteries to be abolished, this symptom is yet very rarely observed! Deafness has been remarked, in some instances, to have been completely established before any other symptom of the disease had developed itself,—the patient continuing, for a time, to pursue his ordinary employments.

Recovery.—When medical aid is early administered, and when the constitution is otherwise healthy, the recovery from an attack of cholera is so wonderfully rapid, as perhaps to be decisive of the disease being essentially unconnected with any organic lesion. In natives of this country especially, in whom there is ordinarily very little tendency to inflammatory action, the recovery from cholera is generally so speedy and perfect that it can only be compared to recovery from syncope, cholic, and diseases of a similar nature; but in Europeans, in whom there is a much greater tendency to inflammation, and to determinations to some of the viscera, the recovery from cholera is by no means so sudden or so perfect; on the contrary, it is too often involved with affections as various as the diseases of these viscera are known to be in this climate. The most frequent of the sequelæ of cholera are affections of the intestines, of the brain, of the liver, and of the stomach. When cholera, however, is of long continuance, and when the *congestion* appears to have been thoroughly established, few, either Europeans or natives, who outlive the attack are restored to health without considerable difficulty.

It has been already remarked that recovery from an attack of cholera is indicated by the return of heat to the surface of the body, and a rising of the pulse. A deceitful calm, however, sometimes attends these favourable appearances, which too often mocks our hopes and expectations.

When the disease is characterised by violent morbid actions, the diminution or cessation of these, however sudden, may generally be regarded as the usual mode in which nature conducts the patient to recovery: but, in what may be termed *negative* symptoms, the steps to recovery are extremely dark and obscure, and the evolution of natural heat and arterial action have occasionally been noticed as amongst the last of the functions which are restored. Patients have been observed to remain for one, two, and even three days, in a state of the greatest collapse, and yet, contrary to all expectation, have recovered.

Urine.—In cholera the secretion of urine, like all the other natural secretions, appears to be very generally suspended. This, indeed, has been considered so much a matter of course that practitioners have very frequently not noticed it in their reports: but, wherever the secretion has appeared to be going on, the circumstance is particularly mentioned. When cholera first appeared, attempts were often made to relieve the patient by the catheter, under the supposition that the absence of urine was owing to retention. When this secretion is not suspended during an attack of cholera, the urine is almost always limpid and clear, though in very small quantity—a curious phenomenon, considering the probable state of the blood under such circumstances: for we may be permitted to infer, from all the symptoms, that the blood is not only deprived of much of its serous or aqueous parts, by the profuse discharges which usually take place, but that the elements of all or most of the other natural secretions are retained in it. We might, therefore, naturally have expected that, if urine were secreted at all, it would possess some striking deviation from its natural appearance. Admitting that the blood is not freed from the elements of the secretions, which usually take place in health, what effect may their presence be supposed to have in producing some of the symptoms of the disease?

It has been remarked, that the cases in which urine appeared to be secreted were not less dangerous than those where this secretion was entirely suspended; but it is much more generally observed, that the appearance of urine, especially when this is the result of *restored* secretion, is always a most favourable omen. In many cases the secretion of urine has not been restored, before a period of fifty hours had elapsed from the commencement of the attack; and it has even been reported that, during a local prevalence of cholera, the secretion of urine has been, in some individuals, entirely suppressed, although no other derangement of the health took place. Instances of this kind were generally observed during great heats, and under much fatigue.

State of the blood.—No symptoms of cholera are so uniform in their appearance and progress as those connected with the blood and its circulation. Although the reports, in general, afforded ample reference to this point, it still appeared to the Medical Board to be one of such importance, in the pathology of the disease, that a circular letter was addressed to about thirty medical officers, who were supposed, from their experience in the treatment of it, to be best qualified to afford information. Attention was especially directed to the following considerations:—First, the influence which the state of the blood, in those affected with cholera, might be supposed to have in producing some of the symptoms; second, the colour of the blood abstracted from a vein in a person affected with cholera; third, the colour of the blood after a certain quantity had been taken, and the effect which any alteration of colour might have on the condition of the patient; fourth, if arteriotomy had been practised, the colour of the arterial blood in cholera; and, lastly, the period, from the first attack of the disease, at which blood was abstracted. It is established by the replies to this letter, as well as by an immense mass of

concurrent evidence, that the blood of persons affected with cholera is of an unnaturally dark colour and thick consistence. These appearances are very uniformly expressed by the terms dark, black, tarry, in regard to colour; and by thick, ropy, syrupy, semi-coagulated, in respect to its consistence. The change in the condition of the blood is likewise fully proved to be in the ratio of the duration of the disease,—the blood, at the commencement, seeming to be nearly or altogether natural, and more or less rapidly assuming a morbid state as the disease advances. Some very rare cases are recorded where, however, this morbid state of the blood was not observable, although the disease had been for some time established; and instances have occurred where the blood flowed readily, sometimes little altered, where, nevertheless, death ultimately ensued. The abstraction of blood has been found, by all practitioners, to be very difficult and uncertain; and the uncertainty has been variously imputed to the feebleness of the circulation, to the thick consistence of the blood, and to the combined operation of these causes. The blood drawn from patients suffering under cholera is stated to be generally very destitute of serum, never to exhibit the appearance of buff, and to be generally disposed to coagulate quickly. Several instances, however, have occurred where the coagulation was slow and imperfect. A great majority of the reports state unequivocally, that, after a certain quantity of dark and thick blood has been abstracted from a patient under cholera, it is usual for its colour to become lighter, its consistence to become less thick, and for the circulation to revive; such appearances always affording grounds for a proportionably favourable prognosis. In many instances, however, no such changes have been observed to accompany the operation of bleeding, while yet the result was favourable. The blood is generally found to be less changed in appearance, in those cases of cholera which are ushered in with symptoms of excitement, than where the collapsed

state of the system has occurred at an early period. The blood has been occasionally found, on dissection, to be of as dark a colour in the *left* as in the *right* side of the heart; affording reason to believe that in the whole arterial system it was equally changed. The temporal artery having been frequently opened, the blood was found to be dark and thick, like the venous blood; but it would appear that this operation has not been performed in general until the attempts to procure blood from the brachial or jugular veins had failed: little or no blood could be obtained, the artery merely emptying itself in a languid stream, not in a jet, and then collapsing. An instance is stated where the surgeon, despairing of other means, cut down upon the brachial artery; but so completely had the circulation failed that no blood flowed. When reaction has been established, the blood occasionally shows the buffy coat.

It would have been highly interesting if, in those cases of cholera which were distinguished by the freedom of the mechanical part of the process of respiration, and by the absence of great alvine or cuticular watery discharges, the colour and consistence of the blood had, in a greater number of instances, been ascertained. The evidence on these points, however, must be acknowledged to be defective. Amongst natives, respiration is pretty generally free until the very last stage; and the colour and consistence of the blood, in the instances where venesection has been performed, has been very uniformly stated to be dark, whether excessive discharges prevailed or not. It may thence be allowable to conclude, without any farther particular evidence, that, though the passage of the blood through the lungs has been free, its natural change is interrupted by cholera. The coldness of the body in cholera—not only on the general surface, but in the axilla—as ascertained by the thermometer, might also warrant us in concluding that the *temperature* of the blood is under the natural standard; but the inference is not sufficiently established by accurate

observation. With respect to the watery discharges, we are not always sure that during life the stomach or intestines have been emptied. These organs have sometimes been found, after death, to be filled with fluid, though no purging or vomiting had been observed. Although, therefore, the thick consistence of the blood would seem to find a ready explanation in the circumstance of the profuse excrementitious discharges robbing it of its natural serum, and although the general tenor of the reports would seem to warrant the conclusion, it must yet be confessed, there is reason to believe, that the blood has been found occasionally to present these appearances when no such discharges had taken place.

The Terminations of Cholera.—The terminations of cholera will readily be apprehended from the observations which have already been made. It is the declared opinion of many of the practitioners who have had to cope with the disease, that its tendency to death is so great as never to be counteracted by the unaided efforts of nature. The same opinion is no less evidently implied by the observations of all, that the delay of but a few hours places the patient beyond the reach of art: for hours are, in this disease, as days in any other. There are not wanting men, however, who, either from an affectation of singularity, or from the melancholy results of their own practice, are said to doubt the power of medicine in the cure of cholera, and to ascribe the recoveries which they have witnessed to the natural unaided powers of the constitution. Such feelings are too apt indeed to arise in the mind when the sad experience of some malignant epidemic visitation, or a succession of intractable cases, comes to be contrasted with the more successful efforts of others, who have had a less formidable enemy to combat; but they are especially apt to arise on hearing of the reputed cures made by the aid of native establishments. It is obviously very difficult to arrive at the

means of making a true estimate on this subject. Where the aid of the European practitioner has been applied, the mortality has still, undoubtedly, been extremely great; and the accounts of native doctors cannot be at all relied on, either for their veracity, or their qualifications to discriminate the disease. Such of the reports of the native revenue servants as have come under the observation of the Medical Board, all tend to prove that by far the greater proportion of people who suffered attacks of cholera, and had no efficient aid, died. The Ameen of Ganjam writes thus:— "The people who get the cholera morbus never recover: death to them is certain." The Resident at Hydrabad states, that he feared every case treated by the natives proved fatal. The family of a wealthy Nair in Travancore, consisting of nineteen people, were all, save one, cut off in a few hours. Another family of five all died. Mr Searle, at Manantoddy, states, that of twenty-eight villagers attacked with cholera, twenty-six died: the other two recovered by his assistance. Death may, therefore, be said to be the ordinary termination of cholera; and there is, in truth, very little variety in the course which the disease pursues towards it. This has already been described as consisting in a general suspension of the natural, and a gradual cessation of the vital functions, rather than in the establishment of morbid actions. Cases have been remarked where the vital functions have been more suddenly overcome, and where death took place before the usual development of the symptoms; others where life is extinguished in some sudden convulsive commotion of the system; and some as if from apoplexy. Fatal terminations likewise occur from topical inflammations supervening; as gastritis, enteritis, or hêpatitis. The intestinal canal seems especially obnoxious to the effects of cholera, numbers of those attacked with it having subsequently been seized with dysentery. The favourable issue of cholera certainly resembles that of diseases usually called spasmodic, unless in

cases where it has lasted so long as to involve other trains of morbid actions, connected with organic lesion, or with a febrile affection of the sanguiferous system. As its fatal termination has been stated to be effected by a suspension of the natural, and a gradual cessation of the vital functions, so its favourable termination may be stated to be simply a restoration of these functions—a change which usually takes place with considerable rapidity, and which often arises under circumstances apparently the most desperate.

Diagnosis.—The diagnosis in cholera is seldom involved in any considerable difficulty or obscurity. The most important distinction is that between the two species of cholera—the cholera biliosa and the cholera asphyxia, especially that form of the latter which is primarily attended with symptoms of excitement. Where the evacuations are tinged of a yellow or greenish hue, where the matter vomited is bitter to the taste, while the skin remains warm, and the pulse good, the disease may be regarded as bilious cholera, commonly so called :—but where, after the first emptying of the primæ viæ, the evacuations are of a watery consistence, colourless, turbid, or white, when no urine is voided, where the surface becomes cold, where the features are collapsed, where the spirits are greatly depressed, and where the pulse quickly flags, the case may almost certainly be regarded as cholera asphyxia. As the disease advances, the cessation of the pulse in the arteries of the extremities, the shrivelled and corrugated skin of the hands and feet, the restlessness, deafness, and general depression, leave no doubt of the nature of the disease. Many affections denominated nervous, such as syncope, cholic, hysteria, dyspepsia, spasm of any kind, and the cold stage of fevers, are apt, during the prevalence of cholera, to create an alarm of it. The remedies applicable to such cases being in general equally appropriate to the treatment of incipient cases of cholera, and their effects in both instances being often

very similar, it is much to be suspected that many of the former have been improperly pronounced to be cases of the latter. Cases of cholera sometimes, apparently, commence by an insidious diarrhœa, or supervene on the action of purgatives, especially saline purgatives, and are then exceedingly apt to be mistaken, both by the patient and his physician. All the experience which we have yet had leaves the mind much in doubt whether this diarrhœa be a primary symptom, or merely indicates a predisposition to the disease. The same observation applies to the effect of purgatives. In such difficult cases, much may be inferred from the state of the epidemic influence prevailing at the time. If cholera be prevalent, they will generally attract immediate notice, and it is the safest course to treat them as cholera: but many of our most lamented casualties have happened from seizures of this description, which were solitary, and altogether unsuspected by the sufferers till too late. There seems, however, to be something peculiar to cholera, in blinding the patient to the real nature of his case; or, perhaps conscious of the tendency of some of his symptoms, he seeks to repress the conviction, and is unable to admit or believe that, with little sensible disturbance of health, he already stands on the verge of his grave.

Appearances on Dissection.—The appearances on dissection, after death following attacks of cholera, have been very extensively ascertained in the bodies of European subjects, but in an extremely limited degree in those of native subjects. This is generally stated to have arisen from the aversion betrayed by the friends of deceased natives to the operation of dissection, as if this aversion were peculiar to them. The truth, however, rather seems to be, that when a European soldier dies, it is extremely rare that there is any person so connected with him as to derive the right of objection to a post-mortem examination; while every native has friends at hand to see the last offices per-

formed to his body. It is probable that, were the cases similar in this respect, we should hear as much of the objections of Europeans as of natives to the dissection of the dead bodies of their friends and relations.

Although dissections are very generally practised in European hospitals in this country, they are performed under some disadvantages, which must operate, to a certain extent, in diminishing the minuteness and accuracy of the information thence derived. The heat of the climate imposes the necessity of interment at a very early period after death, and it likewise imposes the necessity of interring at certain hours of the day, either soon after sunrise, or about sunset. Hence, if a man dies any time between noon and sunset, his corpse is generally interred the following morning; if he dies any time between sunset and noon, the body is generally buried in the evening. It follows, therefore, that there is often but a very limited time allowed for dissection; the pressure of these circumstances, however, not unfrequently leads to the operation being performed so immediately after death as to afford considerable advantages. Dissections have been chiefly made on the bodies of European soldiers—a class of men acknowledged to be peculiarly liable, in this climate, to visceral disease of all kinds. Under these circumstances, dissection reports should be viewed with care, in reference to the general states of morbid bodies, and with the most attentive consideration of the precise import of the terms employed.

The external appearance of European subjects who have sunk under cholera, closely resembles that which has been noticed as taking place during life. The surface is livid, the solids are shrunk, the skin of the hands and feet is corrugated. There seems no sufficient evidence of any uncommon tendency in the body to putrefaction after death, nor of any characteristic fœtor from the abdominal cavity. No particular morbid appearances have been found in any of the cavities of the body, which are lined with *serous*

membranes, or in these membranes themselves. The cavities of the pleura, of the pericardium, and of the peritoneum, have almost uniformly been found in a natural state, or the deviations from that state have manifestly had no connexion with cholera. The surfaces which are lined or covered with *mucous membranes*, have, on the contrary, very generally exhibited signs of disease. These will be noticed, as the organs connected with them come to be mentioned.

The lungs have not unfrequently been found in a natural state, even in cases where much oppression of respiration had existed previously to death. Much more generally, however, they have been found either to be gorged with dark blood, so that they have lost their characteristic appearance, and have assumed more that of liver or spleen; or they have been found to be in the opposite state—that is, collapsed into an extremely small bulk, and lying in the hollow on each side of the spine, leaving the cavity of the thorax nearly empty. This appearance has been so remarkable as to induce Dr Pollock, of H.M. 53d regiment, to conceive, that it could only be produced by the extrication of a gas within the cavity of the pleura, capable of overcoming the atmospheric pressure. It is understood, however, that opportunities were had of piercing the thorax of the dead body under water, and that no gas was extricated. As there appears to have been an absolute vacancy in the cavity of the pleura, (that is to say, the lungs did not by any means fill it,) it would seem that that viscus had exerted a contractile power, adequate to overcome the pressure of the atmosphere. The blood found in the lungs has been always very black. The heart and its larger vessels have been found to be distended with blood, but not so generally as the apparent feebleness of their propelling power, and the evident retreat of the blood to the centre, would have led us to expect. The right auricle and ventricle being gorged with blood, is nothing peculiar to cholera; but some

dissections have shown the left cavities to be even filled with *dark* or *black* blood, which we may reckon as a morbid appearance more peculiar to it. In the abdominal cavity, the peritonial coverings of the viscera, being *serous membranes*, present in general but little deviation from the healthy state; occasionally, indeed, the morbid accumulation of blood in the vessels of the viscera, imparting an appearance of turgidity and blueness, is evident on their exterior surfaces. We also find them bearing marks of inflammation, especially where the patient may have lingered long before death. In other cases, the whole tube has had a blanched appearance, both externally and internally. The stomach and intestines generally preserve their ordinary volume. The appearance of the omentum is not sensibly affected in cholera. The stomach is found to be so variously affected as to destroy all grounds for pathological reasoning. It is very rarely found empty or much contracted after death, nor has any appearance of spastic stricture of the pylorus been often detected. It has, however, sometimes occurred. Its contents appear to be chiefly the ingesta in an unaltered state: in some cases, greenish, or yellow, or turbid matters are found. The stomach has been said to have been found "lined with calomel." Various appearances, either of active inflammation or a congested state of the vessels, have been noticed, sometimes in one part, and sometimes in another. The parts seem as if they were sphacelated, thickened, softened, and friable; and, in short, exhibit so great a variety of appearances, from a perfectly natural state to the most morbid, that no particular light is thrown by them on the disease.

The intestinal tube is sometimes collapsed, but oftener found to be more or less filled with air, distended in some parts into bags or pouches, containing whitish, turbid, dark, or green coloured fluid, and in others presenting the appearance of spastic constriction. The latter, however, is not common. No fœcal or other solid matters are found

in the intestines, but very commonly large quantities of the congee-looking fluid, or of turbid, serous matter. The duodenum, and occasionally the jejunum, have been found loaded with an adherent, whitish or greenish mucus; at other times they have been found seemingly denuded of their natural mucus, and often perfectly healthy. Traces of bile in the intestines, or of any substance apparently descended from the stomach, are exceedingly rare. Sanguineous congestion, and even active inflammation, are stated to be more common in the bowels than in the stomach; but, on the other hand, instances are very numerous where no such indications have beeen detected. The thoracic duct is stated to have been empty of chyle. The liver has been commonly found to be gorged with blood, but not always: it is an organ usually very vascular; and it would probably demand a nicer discrimination than has been bestowed on the subject, to distinguish the degree of congestion in which it is naturally left by the settling of the blood after death in ordinary diseases, from that which has been observed after an attack of cholera. The gall bladder has almost universally been found to contain bile, and, in the great majority of cases, even to be completely filled with it. As is usual with this secretion in cases of retention, it is of a dark colour. Very different states of the gall ducts have been described—cases of constriction and impermeability seeming to be equally numerous with those of an opposite character.

The urinary bladder is found, we may say universally, without urine, and very much contracted. The lining or mucous membranes of the bladder and ureters have been found coated with a whitish mucus fluid. The smallness of the bladder after death has been generally adduced in proof of great spasm, but it is not unfrequently found to be equally small after death from other diseases; and it seems the nature of that organ, when it contains no urine, to contract, so as to leave no cavity. Dr Baillie, in his *Morbid*

Anatomy, thus notices this fact:—"The bladder is also found contracted to such a degree as hardly to have any cavity. This is generally not to be considered as a disease, but simply as having arisen from a very strong action of the muscular coat of the bladder previously to death." The appearance of the spleen, which is so various under the ordinary conditions of the body after death, has indicated nothing that can be mentioned as belonging to cholera. The vessels of the mesentery have been very generally found to be uncommonly full of blood. In the head, appearances of congestion, and even of extravasation, have been frequently observed, but not so uniformly, nor to such extent, as to require any particular notice. Only one case has been given, where the state of the spinal marrow was examined, and in that, indications of great inflammation were detected in its sheath; the case, however, was in some degree a mixed one.

From this general view of the appearances found on the dissection of the bodies of persons who have died from cholera, it is manifest that the information thence derivable is, in a pathological view, of a negative nature only. It is, nevertheless, of consequence in a practical sense, especially in treating the sequelæ of cholera.

Explanation of the Symptoms.—In attempting to explain the symptoms of cholera, it will be necessary to endeavour to generalise them.

We have seen that the natural functions are all in turn disordered, interrupted, suspended; at the same time it is obvious, that not one of these functions is found to be constantly and *invariably* affected by the disease. Of the vital functions, that of the heart and blood-vessels may be stated *to be invariably* affected by it. That of the lungs may perhaps be presumed to be also constantly affected, inasmuch as that it cannot be supposed to be performed perfectly under the state of circulation which takes place

in the disease. This inference is greatly strengthened by the appearance of the blood, by the livid colour of the body in general, and by the reduction of animal heat. The animal functions, as well those of the intellect as those of voluntary motion, appear to be the least affected of any of the other functions. We have seen that *serous membranes* are not necessarily affected in cholera, but that *mucous membranes*, including the skin, which is of an analogous nature, *are* affected; and that this affection is, in some part or other, invariable. In order, however, to understand the remarks which we have to make on this subject, it is necessary to explain what is here meant by the term *mucous membrane.* This distinctive appellation, as it is applied by Bichat, denotes those coverings of the body, of which one side is attached to some part of the body itself, and the other side is destined to be in contact with foreign matters, or such matters as, though derived from the body, are invariably excrementitious. He connects the skin, which is the *exterior* covering of the body, with the membranes forming the *internal* coverings of all the open cavities and passages; and he considers the latter to be merely a continuation of the former. Thus, the skin, and the lining membrane of the ears, orbits, nostrils, mouth, trachea, and lungs, of the æsophagus, stomach, and intestines, are continuous. A smaller surface is exhibited by the lining membrane of the urethra, bladder, and ureters; of the vagina, uterus, &c., continuous with the skin, but not *directly* so with the lining membrane of the other passages above mentioned. *Serous membranes*, on the contrary, are not naturally destined to come in contact with foreign bodies; and they are not continuous with the skin. The affections of the skin and mucous membranes of the body, in cholera, are evidenced by a cold, relaxed condition in the former; and in the latter by the state of the stomach and intestines, from all of which a watery or mucous discharge is largely poured out; and by the state of the bladder and ureters,

which are found to be coated with a mucus similar to that which is observed in the other passages. The fluid discharged at times from the bladder is almost always stated to be *limpid, colourless,* and in small quantity, leading to the inference that it may not be urine, but a mere watery exudation from the lining membrane. That the mucous membranes are affected, is farther evidenced by the moist state of the mouth, even under the most urgent thirst; and by the state of the eyes, where there seems to be a peculiar secretion, or exudation, in the form of a film.

There is certainly no positive proof that all the glandular secretions, as it has been very commonly supposed, are entirely suspended in cholera. The salivary secretion, for instance, has been presumed to be suspended, from the sensation of extreme thirst, but we have a similar sensation in ptyalism from mercury. The secretion of bile has been supposed to be suspended, from the absence of that fluid in the discharges; but it appears that in almost all cases there is abundance of bile in the gall bladder; and in the accounts of dissections it is stated, that bile has been squeezed out from the pori biliarii, as if the secretion of that fluid had been going on. The secretion of urine has also been supposed to be suspended; but the histories of many cases prove, that either urine, or a fluid resembling it, has been voided, even in the worst cases of cholera. It is the concurrent opinion, however, of all medical men who have treated cholera, that the natural secretions, if not absolutely suspended, are at least very greatly interrupted. While the natural secretions are thus suspended or interrupted, there are other discharges established, with the nature of which we are not well acquainted. We have no chemical analysis of the fluid thrown out by the skin, the stomach, or the intestines; and we cannot say whether it be a morbid secretion peculiar to the disease, or merely an increase of a natural secretion. The discharge from the bowels has been thought by some to resemble, and by

others actually to be, chyle. There is evidently, however, no chyle produced while the acute state of cholera prevails, nor are any of its elements present in the intestines, while the regurgitation of chyle from the thoracic duct, hinted at by some, is obviously impossible, on account of the valves of that organ. The discharges bear a strong resemblance to those taking place in some other diseased states. We cannot accurately distinguish between the cold sweat in cholera and that which takes place in many disorders of the digestive organs, nor between the watery discharges from the stomach and intestines in this disease and those which occur in hysteria, and after excessive doses of neutral salts; neither does our present state of knowledge enable us always to distinguish between active and passive excretions. If we could prove that the discharges in cholera were merely *passive*, arising from diminished energy of the vessels, we should make an advance towards its pathology.

According to these views, the symptoms of cholera may be explained by supposing a diminished energy of the nervous system, but especially of that part of it which supports the vital and natural functions. Hence the spasms, or irregular muscular actions, found to occur equally in other instances of diminished nervous energy. Hence also the disorder in the stomach, arising sometimes from spasm of its muscular fibres, and sometimes from the loaded state of its vessels. Hence also the suspension of the digestive powers of the stomach, and its incapability of being acted on by the ordinary stimuli. Hence, also, the various affections of the intestinal canal, which so nearly resemble those of the stomach, that they need not be repeated. These symptoms, in a disease so highly congestive as cholera, will also be imputed by some to error loci of the blood. If red or arterial blood be pressing on the origins of nerves, we shall have undue action and spasms; if black blood, the powers of the nerves will be diminished or destroyed, establishing a state resembling palsy. It may be considered as

a proof of the *atonic* state of these organs in cholera, that no fœcal matter, no chyme, nor any appearance of digested aliment from the stomach, has ever been detected in the bowels; at least none which can be supposed to be formed while the disease existed in a decided form. With respect to the appearance of the gall bladder, it is generally considered as not being muscular, and in the dead body it is either found flaccid, when it contains but a small quantity of bile, or distended, when there is a larger quantity. Bichat states, that it is not contracted according to the volume of its contents; but Dr Baillie, in his *Morbid Anatomy*, observes, "The gall bladder is sometimes distended with bile, so as to be of nearly twice its usual size; at other times there is no bile at all in its cavity, and under such circumstances it is white in its colour, and contracted into very small size." Bichat states, that the bile is caused to flow into the duodenum, by the stimulus of chyme passing the mouths of the ducts; that during hunger or emptiness of the stomach, and during *gastric* digestion, little or no bile flows, it being then accumulated in the gall bladder; but that during *intestinal* digestion it flows copiously. If this be true, we may arrive at some probable reason for the general presence of this fluid in the gall bladder, and its absence in the intestines in cholera. In the first place it has appeared, that no process similar to digestion goes on in this disease, either in the stomach or intestines; hence there is an absence of the wonted stimulus to the gall ducts. Again, as the majority of the attacks are stated to take place in the night or early in the morning, we see in this circumstance another reason why the gall bladder should be very frequently found filled with bile; for in subjects in whom the disease commenced at that period, the digestive processes were probably completed. The bile had therefore ceased to flow into the duodenum; it had begun to accumulate in the gall bladder, and to thicken, become darker, and more acrid there. Other causes of the

retention of bile in the gall bladder no doubt exist. The biliary ducts have been observed to be almost impervious, from their spastic or constricted state, in the bodies of many subjects, who have been examined after death from cholera: and although, in many other instances, the ducts have been found permeable after death, where yet the suppression of the bile had been equally complete, this appearance does not prove that they were not constricted during life. Spasm, or constriction of the gall-ducts, is therefore admitted to be a common cause of the retention of the bile; but as we have shown that this retention is almost universally the case in cholera, while the existence of spasm in any part of the body is certainly by no means proved to be a constant symptom, it appeared that some other cause remained to be assigned for it, which has thus been attempted. The urinary bladder, having strong muscular powers, may either suffer under the influence of irregular spasm, or the mere absence of urine for a certain number of hours may be sufficient to admit of the diminution of its cavity by the natural contraction of its muscle, as already observed. The diminished energy, assumed, of the nervous system, accounts for the depressed state of the circulation, and for the depraved respiration; and we may suppose that these two functions are so intimately connected, that an irregularity of the one will affect the other. It is not, however, intended here to advance, that the suppression of the circulation, and the depravation of the function of respiration, stand in the relation of cause and effect. It is rather believed that they both are effects of the *same cause.* We may also be justified in believing, that a spasmodic action takes place in the lungs in many instances, causing that extreme reduction in their volume, which has been so often observed after death. Whether a spasm of the heart or large vessels be indicated, seems at least very doubtful. We must, notwithstanding, allow, even if the doctrine of diminished nervous energy be

admitted, and the preceding positions deduced from it be granted, that we make but a feeble step towards a satisfactory explanation either of the symptoms, or of the ultimate cause of the disease. The assumed diminished energy of the nervous system is not easily reconcilable with the inordinate action in some parts, which apparently takes place in many cases of cholera; and it is not less difficult to understand in what manner so many of the functions of the brain and nerves should be almost annihilated, while the intellect, and often the power of voluntary motion, should be comparatively little affected.

Predisposing Causes.—All accounts agree in stating, that the young, the healthy, and the robust are the least liable to cholera. The observation of a great proportion of our medical officers being confined to their practice in military hospitals, we have not sufficient data to determine whether there be any peculiar liability to cholera in one sex more than in another; but if the preceding remark be well founded, it might be inferred that the greater delicacy of females, and perhaps their greater tendency to nervous disorders, would give rise to a greater predisposition to it in them, than in males. Children are subject to cholera, but it has been observed, particularly in Mr England's reports, that infants, who have been confined exclusively to the breast, are not susceptible of the disease. This remark, however, is to be received with reserve, as the paucity of that class of subjects, in comparison with any other, must obviously diminish the facility of forming a just conclusion. It has also been very generally remarked, that people, who have been debilitated by recent disease, or by the remedies exhibited for its cure, and even while actually labouring under acute disease, are very susceptible of cholera. Patients under the full influence of mercury have been frequently seized with it; so have pregnant women. One attack of the disease, far from conferring immunity from a

succeeding attack, seems rather to give a predisposition to it. In short, all the causes which predispose to nervous and cachectic diseases, appear also to predispose to cholera; but it must at the same time be kept in mind, in estimating their effects on a population, that the poor and labouring people, who constitute the great bulk of mankind, are the classes chiefly exposed to these causes.

Remote, or Exciting Causes.—The remote and exciting causes, which have been assigned as capable of producing cholera, do not differ, generally, from those which are usually adduced in medical writings as the causes of most of our other diseases. Those chiefly insisted upon are, errors of diet, and sudden changes in it; vicissitudes of the atmosphere; the action of certain medicines; fatigue, exposure, depressing passions, and, in general, every remote cause of diseases of the class neuroses. It will readily be perceived, however, that most or all of these causes have been in operation from the beginning of the world; and, as before remarked, are such as the great bulk of mankind are exposed to in all situations on the globe. It is only during the operation of some other influence, therefore, that such remote causes can be supposed to have any effect. But, with respect to cholera, even during the apparent existence of this supposed influence, we have seen numberless instances, where, at the same place and time, most of the generally received remote causes seem to be innocuous.

For example, while cholera prevailed at Madras, the labourers at certain public works, who were protected from the weather, who were well clothed and fed, and who had no unusual work to perform, suffered from it severely; while a body of many hundred people, employed in digging, and clearing out the beds of stagnant, brackish, and extremely putrid waters, equally during the extreme heats of the season, as during cold and rainy weather, entirely escaped. This immunity is the more remarkable,

inasmuch as many of them laboured during the night, for the purpose of preventing the accumulation of water; and were of course exposed, with very scanty clothing, to the utmost vicissitudes of heat and cold, and to all the exhalations and depositions of the very tainted air in which they worked. It seems easy to conceive that the fatigue and exposure of a camp-life in India, especially during wet weather, would be frequent causes of cholera—and, unquestionably, many of the marching corps have suffered from it severely; but, if we examine more narrowly into the matter, some considerations present themselves, which render the effect of these causes extremely doubtful. Two corps marching together, and apparently in every respect similarly circumstanced, do not always suffer equally. One gets the disease, in a violent degree, ten or fifteen days before the other; or one is attacked, and the other escapes entirely. A corps marched some hundred miles, often under very adverse circumstances, without a case of cholera appearing; yet, where nothing new has occurred—nay, when all their external circumstances have greatly improved—cholera will break out with violence. Its route may be through a country where cholera is not known amongst the inhabitants, and yet the corps suffers under it, and carries the disease along with it; or the inhabitants of the country shall be suffering severely, and the marching corps passes with impunity. One corps will follow the track of another, which is suffering extremely from cholera, at the interval of a day or two, and yet will entirely escape the disease. One corps gets cholera on ascending an elevated country, another gets it on descending into a low country; one corps in a camp suffers from it, while the rest escape; or one corps enjoys an exemption from the disease, while it prevails in the rest of the camp. The food of marching corps, it is to be particularly observed, is always that of the country through which they are moving—the supplies being provided for the day, at each stage.

It will be seen in the narrative, and in the reports, that cholera has appeared, and is equally virulent, during all states of the atmosphere, amidst all diversities of the surface of the country, and under every variety of the circumstances of the people. It seems, however, to be certain that a corps under march runs a greater risk of being attacked by cholera than a corps in quarters; and, judging from all the circumstances, it would appear that to passengers certain tracts are more fatal than others. Hence much of the danger to a marching corps is to be found, not in the fatigues and privations of the journey, but in the risk of traversing an inauspicious spot. Cholera has been observed to prevail amongst a body of European recruits quartered in bomb-proofs in Fort St George, while not a case occurred in men of the same description, who arrived at the same time, and who were conducted direct to Poonamallee, or to St Thomas's Mount; nor in the party abovementioned, after their removal from the bomb-proofs to the Mount.

There is no instance on record, of a ship from Europe having a single case of this disease, until it has communicated with the land; but there are many examples of cholera appearing on board of ships sailing from the continent of India. In such instances, the precise periods when the disease has appeared are not in all cases known; but it is believed that no vessel has suffered from it in a position much beyond the southern tropic. The instance of cholera stated to have been observed on board a vessel on the voyage from Europe, by Mr Corbyn, in his Essay on this disease, is not conceived, on an attentive consideration of the symptoms, to be an exception to the truth of the preceding remark: œdema is marked as one of the symptoms of the complaint, which appeared on board that vessel, and no such occurrence has ever been observed in the cholera of India.

Many instances are noticed where cholera has super-

vened on the use of neutral purgative salts. The effect of these medicines bears, indeed, a strong resemblance to some of the appearances in cholera. The clear, watery, debilitating stools; the chill, and, in feverish subjects, the ague fits which they cause, obviously point them out as unsafe, especially during the prevalence of this disease. Cases of cholera terminating in death have occurred after drinking unwholesome liquors. An instance of this happened in a party of six men, who, after drinking together, were all seized with it, in consequence of which several of them died. Three men, having eaten, at the same time, the seeds of the coral plant, had all the symptoms of severe cholera. Large draughts of cold water have been often observed to occasion relapses, and are even said to have brought on the disease.

It is evident, then, that the remote, occasional, or exciting causes, which have been assigned as capable of producing cholera, are no more specific to that disease than to most other diseases; and, therefore, that we must look for some other cause in explaining its appearance. This cause has been very generally expressed by practitioners in their use of the term, *epidemic influence of cholera.* We do not mean, however, to restrict the inquiry into the nature of this influence to cases of *epidemical* attacks, properly so called; but to consider the primary cause either of sporadic or of epidemic attacks as being essentially the same: in the latter instance it is merely thrown into greater activity by the co-operation of various circumstances, as is the case with many other diseases. By the term *epidemic*, therefore, will be understood merely a general but unusual operation of a specific cause. The immediate cause of cholera—or, in other terms, the epidemic influence—will accordingly be naturally sought either in the atmosphere, or in the soil and its productions, of those countries where it has prevailed; or in a power *sui generis*, arising we know not how, but, having once arisen, capable of propa-

gating itself, constituting what we term contagion or infection. Each of these topics shall be the subject of consideration.

Influence of the Atmosphere.—With respect to atmospheric influence, the general historical observations which have been premised tend to show that cholera has neither been confined to any particular period of time, nor to any particular tract of country; but yet, that it has been infinitely more prevalent at one time than at another, and in one tract of country than another. The narrative and original papers included in the present report, and the other publications on the same subject in Bengal and Bombay, all prove, likewise, that cholera is capable of exerting its influence, undiminished, in every state of atmosphere—so far, at least, as it is evident to our senses, or determinable by instruments. Thus, we have now seen the disease continue for nearly seven years. During this time it has spread to China and the Philippine Isles, eastward; to Mauritius and Bourbon, southward; and to Persia and Turkey, westward. Our accounts do not enable us to say that this range, wide as it is, constitutes the ultimate limits to which the disease has extended or will extend: there is no information which can be relied upon for fixing its progress, hitherto, to the colder regions of the north. Although, however, cholera seems to have arisen, and to have been sustained and spread, despite of all sensible states and changes of the atmosphere, its march over the face of the country has nevertheless been singularly uniform in certain lines of its progression. Instances of immunity from its attacks, in towns and villages situated in or near these lines of its progress, have been, at the same time, frequent and striking.

We are thus furnished, on one hand, with arguments to prove that the cause of cholera exists in the atmosphere; and, on the other hand, with no less powerful reasons for

thinking that the morbific influence may be something arising from the soil, not generally and equably diffused through the air. Ships arriving in the Indian seas ought to suffer under the epidemic influence of the air, if such influence really existed; but it is certain, on the contrary, as already stated, that no instance has ever been recorded of the crew of a ship suffering from cholera until the vessel had come into communication with the land.

There seems no reason to believe, therefore, that the cause of cholera, if it exists in the atmosphere, will ever be detected in any particular state of its sensible qualities. An investigation into the proportions of its natural constituents would be equally fruitless; at least if we may be allowed to judge from the attempts made, with similar views, in many other instances of epidemics, which have invariably failed in throwing any light on the subject. If the epidemic influence really exists in the atmosphere, it can only be referred in general terms, we apprehend, to the presence of some substance or quality of a deleterious kind with which it has become impregnated, which has at all times escaped detection by the senses of men, and has been felt only in its effects.

In order to afford the most ample information respecting the phenomena of the weather, and their effects on the health of the troops, a series of meteorological tables, and of tables of diseases, from the year 1815 to 1821 are given in the Appendix.* A certain intemperature of the atmosphere may perhaps be inferred from the results of the tables of diseases; but its nature will not, it is apprehended, be very readily discoverable in the sensible changes of the weather: the following appears to be the average proportion of sick, compared with subjects in health, exclusive of fractions:—

* These tables, forming nearly a third part of the original folio edition, cannot be given here.

		Proportion of European sick to well in one year.			Proportion of Native sick to well in one year.		
1815	...	158	per centum.	...	60	per centum.	
1816	...	142	,,	...	60	,,	
1817	...	166	,,	...	70	,,	
1818	...	204	,,	...	84	,,	
1819	...	199	,,	...	94	,,	
1820	...	184	,,	...	81	,,	
1821	...	182	,,	...	60	,,	
1822	...	164	,,	...	48	,,	Not in the tables.
1823	...	163	,,	...	48	,,	,, ,,

These numbers *include* the cases of cholera. If the cases of cholera *be excluded*, the proportions will be as follows:—

		Europeans.			Natives.	
1815	...	158	per centum.	...	60	per centum.
1816	...	141	,,	...	60	,,
1817	...	165	,,	...	69	,,
1818	...	189	,,	...	78	,,
1819	...	190	,,	...	88	,,
1820	...	180	,,	...	77	,,
1821	...	178	,,	...	57	,,
1822	...	157	,,	...	47	,,
1823	...	160	,,	...	47	,,

The general health of the European troops would appear to be restored, in 1822 and 1823, nearly to what it was in 1815 and 1816. The increase of sickness in 1817 is about 15 per centum; but in 1818 to 1821, the increase, independently of cholera, is very considerable, and is not to be explained by the movements of troops during these years. The general health of the native troops appears to have been considerably meliorated in the last two years; while a remarkable increase of sickness, independently of cholera, has prevailed among them, coincident with that in the European troops. By a reference to the meteorological tables, it will be seen that the mean altitudes of the barometer and thermometer never differ, in a degree at all important, one year with another, from 1815 to 1821. According to the note at the end of the tables for the year 1820, the barometrical mean of the five years, from 1815

to 1820, corresponds exactly with the mean of the five preceding years; and that the thermometrical mean for the same period only differs by a degree and a quarter. The principal variations distinguishing the years 1817 and 1818 are to be found in the quantity of rain, and the direction of the winds. How far we are to connect cholera with these phenomena must be judged of with careful reference to the mode of its progress through the Peninsula. In 1817 the disease did not appear;* in 1818 it appeared in the most northern parts. In some places the weather was then wet, in others dry; in some, the usual periodical rains were prevailing. It progressed in all situations; and it had not extended to the southernmost points till 1819, when the irregularities of the preceding seasons might be concluded to have lost their effects. After the seasons have been restored to their wonted regularity, and, more latterly, (1823-24,) after a completely opposite state to that of 1818 has prevailed—to wit, a season of unwonted drought, owing to the failure of the rains of the N.E. monsoon, cholera has still unhappily continued to prevail: sporadically, in all parts, and in the instances of many marching corps epidemically, and with much severity and mortality. If the irregularity of the seasons in 1817 and 1818, therefore, have given rise to cholera, we apprehend it can only be in an indirect, and, to us, an unknown manner; and its continuance, after having once originated epidemically, appears to be unconnected, in the main, with any sensible state of the weather.

Influence of Electricity.—A change in the electricity of the atmosphere, especially a diminution of it, has been assigned as the immediate cause of cholera; and, from the ability and perseverance with which the theory has been supported, it merits particular attention. According to Mr Orton's theory, which supposes a diminution of electricity,

* In the Madras territories.

that fluid is the great agent of life—the primum mobile of the brain and nervous system. The functions of these organs are said to consist in a certain influence which electricity, in some sort of combination with them, and constituting what he denominates the *neuro-electric fluid*, is supposed to exert. It follows, according to this hypothesis, that every change in the electricity of the atmosphere is instantly productive of great effects on the living system; at least this is admitted by Mr Orton, for he says, "If a deficiency of electricity in the air which is breathed be proved to be absent, in a single instance of a general attack, the theory must fall to the ground." Now, though we have certainly not been able to ascertain, by experiments, the precise electrical state of the atmosphere during attacks of cholera, it is sufficiently manifest that the disease has raged with equal violence under every sensible condition of the weather; and, in fact, a great number of the attacks have taken place when the sky was clear and serene, and when every appearance indicated an undisturbed state of the electrical fluid. But if a deficiency of electricity be the true and sole proximate cause of cholera, which the theory upholds, it seems objectionable to limit its influence to epidemic attacks; for each individual case, whether sporadic or otherwise, must be equally the effect of this proximate cause.

Admitting, however, that electricity is a great and powerful agent in nature's inanimate works, it does not follow that its influence equally pervades the animate creation. May we not ask, is such an agency either safe, or in consonance with the general laws of nature, as far as we can comprehend them? If the *principle of life* depended on a power so mobile, so variable, and so destructive as electricity, would not every living creature be in perpetual danger? Do we not, on the contrary, observe that the Creator of the universe has made the living body most wonderfully insusceptible of such influences as are naturally much subject to variation; and that those materials which can be

considered as forming the elements of its existence are provided with a steady and unfailing hand? The electric and galvanic fluids are certainly capable of mimicking some of the properties of the living principle, when they are applied to the nerves; but mere irritation of these organs, by hard substances, produces similar phenomena. The living body may be negatively electrified, as well as positively, without suffering more inconvenience in one case than in the other. Instances are frequent of men and animals being even struck down by lightning, and remaining stunned for a time, without experiencing any permanent injury. The animal frame, therefore, seems capable of resisting very great changes in the quantity of electricity. It has been said, indeed, that the electrical fluid evolved by machines *may* not be the same as natural electricity; but we might as well say that the heat extricated in combustion is different from solar heat. Mr Orton admits that the living body is scarcely affected by the greatest changes in the pressure of the atmosphere; and that its power of resisting heat is altogether wonderful.

Oxygen is essentially necessary to animal life; and we see that, of all the products of nature, none is so invariable in its presence and its proportional quantity as oxygen: it may be said indeed, in these respects, to be immutable. From this arises the inference, that its presence *in a fixed proportion* is necessary to animal life. Heat is necessary to life, but not in *a fixed proportion.* In the torrid zone, where this principle abounds, all nature is alive: the air, the earth, and the waters teem with life. As we approach the regions where heat ceases to be manifest, life also ceases to exist. Let us consider electricity. In those warm regions of the earth where life is most abundant, this element is certainly not more plentiful than in more temperate climates; and, far from being deficient in those frigid regions where no living thing exists, it there seems to abound in profusion. May we not therefore conclude, that, whatever

is essentially necessary to life is either supplied in fixed and invariable proportions, or the living body is rendered capable of existing under an almost infinite range of proportions, and of sustaining changes with impunity? Were electricity the principle of life, and were changes in its quantity so noxious as has been alleged, the great Author of the universe would doubtless have made it more uniform; and we may conclude that so powerful, so unconfinable, and so variable an agent, whose powers shake the globe itself, is yet, in ordinary circumstances, by the wisdom of the Creator, made innocuous and of no effect on the living body.

Mr Orton has supported his theory with much ingenious reasoning, on the connexion between the state of the barometer and the electricity of the atmosphere, and between sol-lunar influence and electricity; and he has arrived at the conclusion that, whenever cholera prevails, the weather will be broken, the electricity will be diminished, and the barometer will likewise evince a lessened weight of the air. So far as respects the fall of the barometer being connected with a broken state of the weather, as imagined by Mr Orton, it is quite certain that, in this country at least, these circumstances are not coincident. On the contrary, the barometer is uniformly highest during our rainy season in the Carnatic, and for several months after; and it is uniformly lowest during our hottest and driest weather. The fact seems to be, that northerly winds raise the mercury in the barometer, and southerly winds depress it here, as in all other parts of the northern hemisphere. In the Carnatic, the monsoon rains fall with a north or north-easterly wind, and the mercury in the barometer then begins to ascend; but it ascends equally in other parts, where the same wind is accompanied with dry and cold weather. In all other parts of India the rains fall with southerly and south-westerly winds, and the mercury in the barometer then falls; but it falls then in the Carnàtic also, though under a totally opposite state of atmosphere.

Sol-lunar influence.—Sol-lunar influence, as an exciting cause of disease, has at various times greatly occupied the mind of the pathologist; and it has, in connexion with electricity, been much insisted upon as a cause of cholera by various medical officers—by none more than by Mr Orton. With the view, therefore, of arriving at as accurate a conclusion as possible on this interesting subject, a reference has been made to the registers of sick of this army, in which the admission of every patient into hospital is accurately recorded. From these registers, the daily cases of cholera, for a period of about two years, have been carefully extracted, and they are exhibited in the "Diurnal Tables" in the Appendix. The tables likewise contain a column showing the phases of the moon. The invasion of cholera being extremely sudden, and the time of attack being thus distinctly marked, no other disease could afford greater facilities in the proposed inquiry, as far as it respects individual cases. In the diurnal tables there is no notice of the epidemic invasions, farther than that which is necessarily implied by the number of attacks recorded on each day; but very accurate information on this subject will be found in the narrative and in the original reports. The sum of the information to be derived from all these sources we have attempted to throw into the form of a Diagram,* after the manner of that published in Mr Orton's separate work on cholera. The individual cases of cholera exhibited in this diagram amount to 7,664; and, of these, it appears that 3,725 were admitted into hospital during the quarters of the new and full moon, which, according to Mr Orton, are the *morbific* periods; and 3,939 were admitted during the first and last quarters, which, according to that author, are the *non-morbific* periods. Thus, between the *morbific* and the *non-morbific*, there is only the difference of 214 cases in 7,664; and the excess lies on the side

* The general results being given in the text, the diagram is omitted in this edition.

of the non-morbific. We may hence safely conclude that cholera is not directly affected, in individual cases, by sol-lunar influence. The increase in the admissions, especially of Europeans, which is exhibited in the last quarter of the moon, a *non*-morbific period, may be referred to the unsettled weather which generally prevails at that time, operating as an occasional or remote cause. It remains, however, to be shown whether the general attacks, or epidemic invasions of cholera, are influenced or not by the moon; and this subject presents some difficulties, from which the consideration of the individual cases is free. The commencement of an epidemic invasion should, perhaps, be computed from the date of the *first case* of the series which is comprised in the attack; as we may suppose that *then* the morbific influence began, and that those subjects who were most predisposed soonest manifested its effects. But it is not possible always to distinguish between sporadic cases and those really forming the commencement of a general attack; and some very remarkable instances of sudden aggravations have been observed in the course of such attacks, which would seem to indicate some new influence. The reader will find the materials, on which the computation of this part of the diagram was founded, in the narrative and original reports. The results of the examination, as exhibited in Roman characters in the 4th line of the diagram, tally very closely with that of the individual cases in the 2d and 3d lines. In the *morbific periods*, or the quarters of the new and full moon, we find 57 beginnings of epidemic attacks; and in the *non-morbific* periods, or the first and last quarters, we find 64 beginnings. Thus, as in the individual cases, the admissions were most numerous during what has been styled the *non*-morbific periods, so also the commencements of epidemic attacks have been most frequent during these periods—the difference being 7 out of 121 visitations. We may hence conclude that cholera is not affected by sol-

lunar influence, either in individual cases or in epidemic attacks.

This subject would not have occupied so much attention, but for the great importance which has been attached to it by various medical officers. Mr Orton has especially dwelt upon it, both in his papers, which appear in this report, and in his separate publication on cholera. In proportion, therefore, as that author is entitled to our respect, founded on the great extent of his researches, and the acknowledged respectability of his talents and acquirements, so it behoves us to examine, with scrupulous care and circumspection, opinions that go forth recommended by his authority.

Influence of the Soil.—We have few observations to offer regarding the influence which the soil might be conjectured to have in the production of cholera. The sudden, unaccountable, and insulated nature of many of the attacks have led to surmises respecting the possibility of certain noxious exhalations having arisen from the ground ; but these surmises are not founded on any facts or experiments.

Influence of deleterious Articles of Food.—Much has been said and written respecting the agency of a deleterious article of food, supposed to be the exciting cause of cholera—namely rice of a certain quality, known by the term loose rice, and denounced by Dr Tytler, of the Bengal establishment, as the sole cause of the disease. The doctrine has been supported by its author with great spirit and perseverance; but it appears to have aimed at too much, and to have rested on grounds which, in the progress of the disease, became manifestly untenable. The author of the theory having advanced that noxious rice was the sole and exclusive cause of cholera—to which disease the name of morbus oryzeus was accordingly applied—his opponents appeared satisfied when they could disprove the general

fact, by showing examples, where the disease occurred without rice being used; and did not carry their consideration to the question, whether other grains might not have acquired similar deleterious powers. Dr Tytler complains, that his views have not met with that liberal and candid consideration which an attempt to elucidate so important a subject certainly merits. This is the more to be regretted, since the theory, which refers the disease to the action of poisonous food, appears plausible; and all the symptoms might probably be accounted for with tolerable facility by it, provided we could prove its truth in general. The first objection to the supposition that cholera is caused by bad food is naturally that which arises from the mass of people eating, without bad effects, the product of the soil whereon they live, or the supplies of their markets drawn from more distant quarters. It seems impossible that one person shall be immediately poisoned by eating that, which those around him eat without inconvenience. The arguments hitherto brought against the supposition of rice being the cause of the disease are, therefore, not quite conclusive, except that it may be affirmed not to be the sole, or even a *common* exciting cause of cholera. The subject of the influence of unusual seasons on the food of man, and also on the waters of the earth, is nevertheless highly deserving of attention.

The replies to the queries addressed by the Medical Board to the surgeons of the 41st and 54th regiments, respecting the use of rice, (page 233,) may be considered as conclusive against the fatal attacks of cholera experienced by these corps being in any way connected with it; but as the men might have, and no doubt had, opportunities of eating other products of the Indian shore from the time the vessels came to anchor in the roads of Madras, it will be proper, in this place, to consider the subject a little more closely.

The crews of vessels, and the troops on board, have not, as we have already seen, ever experienced an attack of

cholera, till they had communication with the shore. It is not known what has been the earliest period, after reaching an anchorage, at which cholera has occurred on shipboard; but, in the instance of the second wing of the 41st regiment, men were attacked on the very morning of their landing, which was the second after their arrival in the roads. It is believed that the crew of that vessel, the Asia, did not suffer from cholera. The crews of the Thomas Coutts and William Fairlie, though put immediately on fresh provisions, did not suffer from the disease until a considerable time after the troops which had disembarked from them were attacked; and then it was not so generally prevalent amongst the crew, as we might have expected had the cause existed in their food. Regiments marching, are supplied at each stage with the same articles of food, which are to be procured in the markets of the respective villages; but we find that cholera has appeared amongst them, when it was unknown to the people of the tract in which they were at the time; or it has raged amongst these people, without appearing among the troops. One body of men following another sometimes get the disease, when their immediate precursors escaped it; or, the former escaped it, when the latter suffered most severely: yet all have subsisted on the same food. When the disease is once established in a corps, it runs its usual course; although, by continuing the march, the corps has in the mean time moved far from the country, and its supplies, where cholera first appeared. Again, if this disease depended in an especial manner on the food, all new comers should, ceteris paribus, be equally liable to it in the proportion of their numbers; but nothing can be more contrary to experience than this. There is a very curious notice of the possible effects of bad water in producing cholera, in Mr Cruikshanks' report, page 237. This leads directly to the inquiry—at what period, from the application of the cause, cholera usually appears; and what are the limits of its

operation. We have abundant ground for belief, in all the reports on the subject, that the period of its appearance, after the application of its cause, may be, and very often is, extremely short; nay, almost momentary. On the other hand, there are circumstances which lead us to believe that this period may be greatly protracted. A ship, for instance, leaving an Indian port, has sailed as far south as the equator without having a case of the disease. It then suddenly appeared with great virulence and mortality, and all the susceptible men, as it would seem, having suffered in the course of two or three days, the disease has immediately and finally ceased. It is stated by Mr Duigan of the 89th regiment, that, a field force having embarked at Bombay for Malwan, on the 13th January 1819, he was called on the 14th to visit, on board one of the small vessels conveying the troops, an artilleryman who had been seized with cholera. On the 15th the force landed; and this party of artillery furnished two more cases on that day, and two on the 16th. All these five men died. On the 17th several slighter cases occurred; but they recovered. The disease ceased: nor did it affect any other individual of the force. These instances are selected because, being at sea, we may conclude that the men were not exposed to the same exciting causes which usually affect bodies moving by land. The idea, therefore, that the men of the first battalion 9th regiment may have suffered attacks of cholera from drinking bad water at Cunnatore, as Mr Cruikshanks has mentioned, is not absolutely invalidated by the circumstance of the disease having appeared successively, and at a certain interval after having drunk the water.

To enter into the consideration of the miasma which may be supposed to contaminate the atmosphere, and so become the exciting cause of cholera, would lead us into a discussion of the doctrines of epidemics and endemics in general: but this is a subject so little understood, and rest-

ing on data so extremely uncertain and undefined, even in the cases which have longest occupied the attention of mankind, that to attempt any illustration of the pathology of cholera from it would be fruitless. An attentive consideration, too, of the history of cholera will show, that many of the circumstances connected with it are peculiarly unfavourable to the opinion of miasma being the cause of the disease.

Contagion or Infection.—It only remains to consider the subject of contagion, or infection, as relating to cholera. In entering on this part of the inquiry, we must greatly lament the absence of fixed and acknowledged principles, by which the various circumstances connected with it could be estimated. There is, however, as respects cholera, another difficulty, which is not felt in discussing the infectious or contagious nature of any other disease. It is this: if, as our reason and experience lead us to believe, it is a disease of the class Neuroses, our knowledge of the laws of infection or contagion drawn from the study of the diseases of the pyrexile class, limited as it is, may not be fairly applicable to one of so opposite a nature. In judging of an infectious quality relative to cholera, it is likewise necessary to keep in mind the suddenness of its attack, and the extreme rapidity of its course; the former instantly arresting the locomotive powers of the individual subjected to it, and the latter contracting, to a very circumscribed period, the faculty of producing, if it does produce, infectious matter. Now, in many infectious diseases, the individual affected retains the power of moving to a distance before the development of the disease; and, during its progress, he possesses the power of contaminating those who approach him, during a much longer period than can be the case, in general, with patients in cholera.

If this question could have been decided simply by the opinions of a majority of medical men, it would already

have been set at rest against the doctrine of contagion or infection: for there are perhaps few subjects on which so little diversity of sentiment has existed. The grounds of these opinions, however, have not been very accurately explained, and, where they have been detailed, they have been combated by those practitioners, few indeed in number, who have entertained opposite views. It is, therefore, necessary here to enter somewhat at large into the consideration of the arguments which may be adduced on either side. In order to obviate any misconception of the import of the terms contagion and infection, it will be proper briefly to explain the precise meaning in which they are employed in the following observations. By contagion, it is meant to indicate the communication of disease from the body of one person to that of another, by actual contact. By infection, it is meant to indicate the communication of disease from the body of one person to that of another, through the medium of the atmosphere, without actual contact.

It is not contended by those who embrace the doctrine of infection, that cholera has not arisen spontaneously as well at the present as in former times; nor is it considered that this circumstance affects the question. We see that various other diseases, generally admitted to be infectious, also arise, to all appearance, spontaneously: at one time, without spreading as an epidemic; at others, appearing to possess the power of doing so in an eminent degree. We are confessedly ignorant of the circumstances under which these phenomena take place. It is further contended, that there are very great differences in the respective infectious or contagious powers of different diseases; and that the laws which govern epidemics in general are not sufficiently understood to enable us to pronounce, whether their spread depends or not, on a cause of an infectious or contagious quality.

It appears immaterial, whether the causes of the epide-

mic cholera in 1817 were limited by narrow or extended boundaries. The true objects of inquiry would seem to be comprehended in the following queries:—Has the disease spread over countries, which, in respect to climate, and soil, and population, were previously under different or opposite circumstances from those of the country where it began? Can it be shown that the circumstances of the countries, which it subsequently pervaded, were, by a gradual change, assimilated to those of the country in which it first appeared? Is it manifest that its prevalence in new tracks has been increased by the occurrence, during its progress, of new causes connected with the circumstances of the country or climate, which yet were insufficient for its original production there? Have we sufficient evidence to decide that cholera has in any instance, or under any circumstances, been produced by personal intercourse, or by actual contact? It is not the object of the present report, however, to enter minutely on such an extended inquiry, but, in connexion with the reports of the other Presidencies, to attempt to afford grounds for doing so.

Cholera has gradually spread from the central parts of Bengal to all the adjacent countries. Though it may have appeared nearly simultaneously in many parts of Bengal, situated at considerable distances from each other, yet its progress beyond that tract has been uniform and progressive. We have seen this fully exemplified in the progress which it has made during the space of five or six years; it having, in that time, reached very distant countries, and left no interjacent countries untouched. In respect to the Peninsula of India, which is more immediately the object of this report, the narrative, and the map prefixed to the work, will clearly evince that the progress of the disease, from north to south, has been affected with surprising regularity both geographically and chronologically: for any deviations which may appear to have taken place in the regularity of its march, in regard either to place or

time, may with some probability be referred to the intervention of cross-roads, or to the interruption of regular main roads, and to the effects of the prevalent winds. For example, its progress during the S.W. winds was slower from Ganjam to Nellore, than it was from the latter district to the remaining southern portion of the coast, after the wind had set in from the N.E. Even admitting that insulated cases of cholera have appeared in some places, before any had happened immediately to the northward of these places, it would be but reasonable to view them as sporadic, since they have been shown at all times to have occurred, and to be in fact endemial, in the climate of India. The wide and uniform diffusion of cholera which we have witnessed, has taken place over countries bearing little or no resemblance to that where it originated; and their climate and seasons, especially, have been altogether dissimilar. It may consequently be inferred, that the disease has either been propagated by infection or contagion, or that its progress is owing to circumstances beyond our knowledge; thus ranking cholera amongst many other epidemics, the causes of whose origin and progress are equally unintelligible and unknown, The latter conclusion obviously leaves the question of the infectious or contagious quality of cholera undecided. The supporters of that theory object to the occult or unknown circumstances alluded to being resident in the atmosphere, forming what might be termed its choleric constitution: for, they observe, the disease, in that case, could not make any sensible progress directly against the continued and violent monsoon winds; nor could villages nor tracks of land escape the disease, where all around them were suffering from it. They confirm these arguments by the following facts.

Bodies of troops in motion have been attacked, and have retained the disease, while it was unknown to the fixed inhabitants of the country through which they passed.

One of two corps in a camp has been attacked, and the other has escaped the disease. Ships arriving from other parts of the world have never suffered under the assumed epidemic constitution of the atmosphere before reaching the shore. They farther urge, that the supposition of a power, not infectious, existing in the air, which is capable of producing the disease, is purely gratuitous, and has been shown to be hardly reconcilable with our acknowledged experience. Diseases avowedly infectious, such as small-pox, measles, &c., have not at all times the power of spreading epidemically; for while it is certain that their exciting causes are never wholly extinct, it is only at particular periods that these diseases become epidemic; but we are not acquainted with the circumstances under which this power of epidemic propagation arises. The same may be the case with cholera, though the causes of its epidemic diffusion would seem to occur only at very lengthened intervals. All the atmospheric phenomena, and other circumstances brought under the head of occasional causes, have with little or no interruption existed from the beginning of time, without producing cholera except at those particular periods. Consequently, the superaddition of a new cause must be inferred. Such are the arguments which the supporters of the doctrine of infection or contagion have derived from the general appearances attendant on the rise and progress of cholera.

The *particular* evidence that cholera has been propagated from place to place, or from one body of men to another, or one individual to another, it must be admitted, is attended with many difficulties. There are several instances recorded, where cholera has been first manifested at a place, in the attack of an individual, who had come from some other place, where the disease existed. The first case of a European, which occurred at St Thomas's Mount, was that of a man who had left Madras on the morning of the 15th October. Proceeding on his journey

towards Trichinopoly, in the evening, he was taken ill about a mile from the Mount, brought back to the house where he had passed the day, and there died. On the 17th, the wife of that person; on the 19th, the owner of the house; and on the 21st, *his* wife; all experienced attacks of cholera, but recovered. Several of the native servants also suffered. The instances of the disease appearing at places immediately after the arrival of corps and detachments, which were suffering from it, are very numerous. For example, it appeared at Jaulnah immediately after the junction of a party from Nagpoor, amongst whom it prevailed. It appeared at Aurungabad, and at Malligaum in Kandeish, after the arrival of parties who had left Jaulnah at the time the disease was prevalent there, and amongst whom it had broken out on the march to these places. It appeared a second time at Malligaum after the junction of the 1st battalion, 5th regiment, in which cholera prevailed. It appeared at Secundrabad after the arrival of a detachment suffering from it; and it appeared afterwards in the villages through which the detachment had moved. It appeared at Gooty, where no case had been observed for six months before, immediately after the arrival of the 1st battalion, 16th regiment, in which it prevailed with great mortality. It is remarkable, that the same formidable type of the disease, which prevailed in the marching corps, was communicated to the corps at Gooty. It also spread on that occasion to the adjacent villages. It appeared in a detachment of artillery, previously perfectly healthy, upon their encamping on the ground which had been immediately before vacated by the 1st battalion, 8th regiment, N. I., in which corps the disease prevailed; the bodies of several persons who had died of cholera remained exposed on the ground, when it was taken up by the artillery. Moreover, marching corps and detachments have been seized with cholera on coming to places where it was prevalent.

The following extract of a letter from the collector of

Bellary deserves to be noticed:—"It (cholera) first made its appearance in the neighbourhood of Gooty, where the 2d battalion, 1st regiment, N. I., which had suffered severely from this disease, halted for some time; it subsequently appeared in nearly every village on the route of the 15th regiment, N. I., which was also severely attacked by the cholera as it passed through this district, and which halted at this station till the disease disappeared: in some of the larger villages, such as Dhurmaveram, it has carried off nearly 200 souls." "Doubts may be entertained of the contagious nature of the disease; but it appears to me quite certain, that the infection has been communicated or created here by the two regiments before noticed. The disease was unknown here until they arrived: it broke out where the first diseased corps halted for some days, and at nearly every village at which the other stopped; it has been unknown in any other part of the district; and though it was unknown both in the 15th N. I., and in the villages through which it passed, until they arrived in this district, it no sooner broke out among that body of men on march, than it communicated itself to the fixed residents who were before exempt from it."

When cholera appears in a street, it has frequently been observed to pervade almost the whole of the dwellings in it; and when it appears in a family, to affect several of its members successively. Cholera has been remarked to have travelled chiefly by the great roads, affecting the villages on either side of it, without perhaps extending to those situated at any considerable distance. The 6th regiment of cavalry having left Ellore, where cholera did not exist, arrived at a place where it prevailed; and a squadron of the regiment having been necessitated, from the loss of their tents, to take possession of an old pagoda in the village for shelter, cholera broke out in the corps at that place; and this squadron furnished almost every case of it. The prisoners in a jail enclosed with a high wall have

escaped cholera, while it prevailed all around them; and the inhabitants of certain hilly ranges have also escaped the disease. These have been said to have interdicted all intercourse with the people below. When cholera is once established in a marching regiment, it continues its course in spite of change of position, food, or other circumstances. Its approach to a town has been traced from village to village, and its first appearance in the town has been in that quarter which was nearest the track of its progress. For instance, it approached the town of Salem from the west, visiting all the villages on that road. It was some days in Shevapett, situated a quarter of a mile to the west of Salem, before it appeared in Salem itself; and it was several days in passing from Salem to Amarpett, three quarters of a mile eastward of it. Mr Superintending Surgeon Duncan states, that when cholera appeared in the 34th regiment, on the route from Bellary to Bangalore, all the villages which they passed suffered from it immediately afterwards; and a native soldier, travelling from Bangalore to Nundidroog, at neither of which stations cholera had appeared, passed through the camp of the 34th regiment while the disease prevailed, was attacked by it, and died shortly after reaching Nundidroog.

The sudden appearance and disappearance of cholera, however unlike the progress of known infectious diseases, is not admitted as being irreconcilable with the doctrine of infection, especially if the disease be of sudden invasion after the application of the exciting cause.

The evidence which has been adduced in favour of the infectious or contagious quality of cholera, as it respects the intercourse between individuals, may be thus stated. The relations who have attended on people ill of cholera, as well as the nurses appointed in military corps for that duty, and, in general, those whose employment has led them to be much with the sick, have been observed, in very many instances, to be attacked with cholera during or

shortly after their attendance. For instance, a soldier's wife is taken ill and dies; her friend in attendance is also taken ill, but recovers; while the husband of the former is seized the same day at noon, and dies in the evening. Many such examples might be produced. The sick in hospital, labouring under other diseases, have likewise been observed to be attacked with cholera, especially those who lay near the patients ill with that disease. Sometimes whole families have been swept off successively. Servants have often been observed to sicken after attending their masters. The instances, however, above recited, are by no means uniform: they are indeed opposed by directly opposite experiences: but it is contended that a greater proportion of people, occupied as above described, have been attacked with cholera, than has been observed to be the case in an equal number of people who were not employed amongst the sick. It should be remembered also, that medical men, and hospital dressers and servants, being inured to the contact of sick, are less liable, on that account, to receive infection. The exact number of medical officers and servants who have experienced attacks of cholera, during the prevalence of that disease in the hospitals at which they officiated, cannot be ascertained. It is known, however, that thirteen medical officers of this establishment have died of the disease, and that between fifteen and twenty suffered attacks of it, but recovered: in perhaps every instance the officers had been previously engaged with patients under cholera. The circumstances of some of these attacks are very remarkable. The medical officer, in repeated instances, has been the only European in the corps or station who has suffered, Dr Daun and Mr Assistant-Surgeon Gray, of H. M. 89th regiment, were both seized with the disease, after intimate intercourse with the sick; and the two friends who attended the latter during his severe illness, were also seized, while no other European officer of the corps suffered.

It has been already observed, that by far the greater number of medical men concur in the unqualified opinion, that cholera is not an infectious or contagious disorder; and they conceive that the phenomena of its origin and progress can be more satisfactorily explained by the laws of epidemic diseases in general. They observe, that there has been a marked intemperature of the seasons preceding and accompanying its appearance; and they assume that a certain, though perhaps occult morbific state of the atmosphere has hence taken place, under the influence of which the predisposing, occasional, and exciting causes, universally admitted, are sufficient for its production. Such a condition of the atmosphere may not be so general as to pervade a whole country at once: it may arise, specifically, from the soil of certain tracts only, and it may possess the power of producing a similar condition in the air with which it comes to be commixed. The progress of almost all epidemics has been more or less progressive and gradual, although the concurrent opinions of most medical men have been directly adverse to the idea of their being of an infectious nature.

They contend that, if cholera had been infectious or contagious, it would be utterly impossible to account for its partial invasions, as evidenced in the many instances already cited; thus two corps marching together and keeping up an unreserved intercourse, the disease shall prevail in one and be unknown in the other; troops passing through countries suffering from it entirely escape; or they experience severe attacks, while the inhabitants of the countries through which they pass are exempted: detachments of a regiment, arriving from a particular place, suffer severely, while the rest of the regiment, which has remained stationary, shall hardly furnish a single case, although the former may be living in the same barracks, and their sick in the same hospital. Above all, they contend that the evidence of the non-infectious or non-contagious quality of cholera

is clearly established, by the escape, in so many instances, of the attendants on the sick; not only in the case of medical attendants, who may be admitted to be inured to the contact of sick, but of the attendants of every description, who have slept on the same beds with the patients, and sustained such an intimate intercourse with them in every way, as to render their general immunity from the disease altogether irreconcilable with the idea of infection or contagion. They observe that if medical men have in some, or even in many instances suffered, and if the relations, and attendants, and whole families have fallen victims to the disease, it is fairly attributable to the effects of their great fatigue, their anxiety, their mental depression, and their exposure in common to the occasional causes, such as bad food, privations of various kinds, indifferent shelter, and peculiar local circumstances.

The most striking instances of immunity from the disease, under the most intimate personal intercourse, will be found recorded in the original reports. In the hospital of the Royal regiment, only one individual, out of a hundred and one attendants, was attacked with the disease. In that of the 11th Native regiment, at Vizianagram, as recited by Mr M'Andrew, page 33, not one was seized, although their numbers would seem to have been great. In the hospitals at Trichinopoly no attendants were taken ill. Many medical officers appear to have slept in their hospitals without suffering any bad consequences. At St Thomas's Mount, where a general receiving-hospital for patients with cholera was established, and where the numerous attendants were people not at all accustomed to hospitals, not one of them was taken ill; yet it was not uncommon to see them using the bed-clothes of patients who had just recovered or died. The same observation applies to the numerous receiving-hospitals established at Madras. Mr Acting-surgeon Gibson, in reporting on a late attack (April 1823) experienced by the 69th regiment at Wallajahbad, observes—" I had

ninety-two admissions, and increased the establishment of servants to double; I lived in the hospital amidst the sick, day and night, and yet neither I myself, nor any of the servants, got the disease; but the hospital-sergeant's wife, living in a retired room, not near any disease, had a severe attack. The disease came on suddenly with a hot land-wind, and went off as suddenly when it ceased.* At my suggestion, that wing of the regiment in which the disease prevailed the most, was encamped on a piece of high ground in the neighbourhood, and not a case came in from camp, although every intercourse imaginable was kept up between it and the barracks. No steps were taken to prevent contagion, when this wing of the regiment returned to the same barracks, and yet no cholera has since been heard of."

It will not escape the observation of the reader, that many of the principal circumstances which have been noticed in the history of cholera, are left wholly unexplained by either doctrine; and, amid such a variety of conflicting opinions and contradictory appearances, it seems fruitless, if not presumptuous, to offer any decided judgment. The question will doubtless receive its decision, when our knowledge of the laws of infection in general is more matured; but its merits have at least been attempted to be fairly exposed, as their consideration may, in abler hands, perhaps throw some additional light on the subject.

Proximate Cause.—Mr Orton, in his very valuable work on cholera, lays down these two propositions:—

1st. That the proximate cause of cholera consists in a diminution of the energy of the nervous system.

2d. That the deprivation of nervous influence thus pro-

* The first case was admitted on the 9th April 1823, and the last on the 25th June: the severity of the disease was in April—68 admissions and 16 deaths took place in that month: 20 admissions and 2 deaths in May: 4 admissions and no deaths in June.

duced, extends to all the functions, and immediately produces the phenomena of the disease.

The first proposition would seem to be pretty generally admitted as true, leaving the question of the origin of the assumed diminished nervous energy open to discussion. The second proposition is more questionable. If Mr Orton considered that the "diminution of the energy of the nervous system" and "the deprivation of nervous influence" are synonimous terms, it is to be regretted that the same expression was not used in both of his propositions; for it is probable that many of his readers may understand, by nervous energy, that state, inherent in the nerves, by which they are capable of being duly affected by their natural stimulus; and, by deprivation of nervous influence, they may understand the subduction of the natural stimulus. At any rate, the nerves themselves may either be primarily the seat of disease, or they may be in a healthy state, but deprived of their natural stimulus: still, the system at large will thus suffer under diminished nervous power. The functions of the brain and the functions of the nerves would not seem capable of being resolved into a single and undivided function; nor is it proved that the cause of these functions is one and the same. There appears, from the history of cholera, to be even very little connexion between one part of the nervous system (including the brain) and another. If there were but one general cause of the functions of the brain and nerves, then a subduction of that cause would lead to "a diminution of nervous energy," and it would "extend to all the functions," as assumed by Mr Orton: but evidence is not wanting to show that the functions are very far from being generally affected in cholera; and it seems more reasonable to conclude, on an attentive consideration of the phenomena of the disease, that the symptoms are severally produced by one or other of these causes—a diminished energy, *primarily* arising in that part of the nervous system governing the respective *seats* of the

symptoms; a want of the natural stimulus; or a diminution of the nervous power, arising from a cause originating in these *seats*, and affecting the nerves *secondarily*. Mr Orton, assuming the truth of the two propositions above stated, refers the diminution of nervous energy to a deficiency of electricity. It seems impossible to conceive, however, even admitting electricity to be the principle of life, that the effects of its mere deprivation should be manifested by cholera, and by cholera alone: but the fact of such deprivation, it has been already attempted to show, is very far from being established.

The proximate cause, or what would be more correctly expressed by the term, the nature of cholera, we would imagine not to be essentially connected with the lesion of any organ, but to be a morbid affection of the system or set of organs, by the powers of which the vital and natural functions of the body are conducted, and on which life depends. This morbid affection, however, we should conceive to be distinct from a mere negation of the powers which naturally excite these organs. If it were a mere negation of influence, we might expect to see a simple cessation of their functions, but not the morbid phenomena usually displayed in cholera. We may, indeed, consider the affection of the sanguiferous system as an example of such simple cessation of function; and this being by far the most formidable symptom of cholera, it must be allowed to give weight to the opinion we are combating. It has been very generally concluded, though perhaps without sufficient reason, that the power producing cholera is of a sedative nature.

There is an analogy, or resemblance, between the symptoms of cholera and those produced in the body by certain animal and vegetable poisons and other noxious matters, but by no means so perfect as to advance us, in any very material degree, in our knowledge of the nature of the disease. According to the experiments of Mr Brodie, cer-

tain vegetable poisons act by destroying the energy of the brain. In these cases the blood is found to be of a dark or black colour; but the heart is not immediately affected, and it continues to circulate this black blood for some time after death: others act at once on the heart, and, by a suspension of its action, destroy life: in these cases the blood is of a florid or scarlet colour. In cholera, however, there seems to be an equal diminution of those powers which produce the circulation of the blood, its florid colour, and the evolution of heat. The exhibition of the Upas Antiar, which, in its effects, approaches the most closely of all the poisons to the nature of cholera, is yet found to be attended with a florid colour of the blood. The action of this poison is upon the heart. The larger arteries are found, on dissection, to be extremely distended with blood, and on their being punctured, it starts vehemently from the orifice. The effects of this poison are stated to be, debility, cold sweats, spasms, restlessness, vomiting, purging, and great congestion in the internal vessels. The Upas Tieutte, or tchettick, supposed to act on the brain, causes death very suddenly, and with fewer of the symptoms of cholera. Here the action of the heart goes on for some time after apparent death. The blood is black, but there is no congestion.

It must be confessed that, if we candidly examine our knowledge of many other diseases, we shall find that we are nearly or altogether as ignorant of their proximate cause, or *essential nature*, as we are of that of cholera. The sum of our knowledge amounts, in fact, to little more than this, that we know certain diseases are peculiar to certain climates, that other diseases are common to all climates, and that the application of certain exciting causes will in one case be followed by a peculiar, or what is often called an endemic disease, and in another by some ordinary disease. Cholera is evidently a disease which is endemial to a hot climate; that is, under the influence of a hot climate, the

human body is disposed to fall into the morbid action, which constitutes cholera. What that influence is, or how it should be liable to change, so that at one period the disease is hardly known, and at another it spreads as an epidemic, we are entirely ignorant—as we are in respect to the influence producing hepatitis, dysentery, fever, and many other diseases. This disease, then, is natural to India; and its *late prevalence* is no more a proper subject of surprise or investigation, than its preceding *long absence.* From the circumstance of the skin and mucous membranes being so very generally affected, we may perhaps infer that many of the exciting causes act directly on these surfaces: but we can no more explain how these at one time produce cholera, and at another not, than we can, how, in the climate of India, the liver is more prone to run into inflammation and suppuration than in a colder one. We can form no rational conjecture how, or in what manner, the morbid state of the brain and nerves, which is supposed to constitute the proximate cause of cholera, can arise without the intervention of an external exciting cause, though we are not warranted to conclude that this is impossible.

Before dismissing this subject, it may be proper very briefly to notice some of the theories which have been brought forward in explanation of the proximate cause of cholera. One of the earliest of these was the absence of bile. It must now be sufficiently apparent that there is no want of that fluid, although its flow into the intestines is pretty universally interrupted. In certain instances, however, bile has been present both in the stomach and intestines without altering the fatal nature of the attack. As a prognostic, the return of the flow of bile is most favourable, not from the presence of that secretion being in itself subversive of the morbid state, but as indicative of the restoration of one of the natural functions. Cholera has been supposed by one practitioner to be caused by an over-secretion of the gastric juice; and the appearance of the dis-

charges has by many been likened to that fluid. There is, indeed, hardly any other argument in support of the idea than this resemblance, which, however, is by no means uniform. The theory seems sufficiently disproved by the frequent occurrence of cases in which no discharge from the stomach or bowels takes place—the author imputing the train of morbid symptoms to the "gushes" of that fluid, which would, at least, imply such quantities as we could hardly suppose to be retained. Some have supposed a spasm of the extreme vessels, others a spasm of the arteries, to be the proximate cause of cholera. There is certainly no evidence in support of the former doctrine: on the contrary, every appearance leads to the conviction that there is a great relaxation of the extreme vessels; and the cases in which arteriotomy has been performed would rather lead to the conclusion that the arteries had lost their contractile power. The blackness of the blood in cholera has been viewed by many practitioners as at least very intimately connected with the most formidable of its symptoms, if not to be their proximate cause. Experiments, however, have proved that the circulating power of the sanguiferous system will go on without interruption, although the blood be black: it is also found to be black in some other diseases; and in cholera it seems proved that the blood occasionally retained its florid colour, after the disease had been established for some time. The function of the lungs, in reddening the blood, is sometimes preserved, as shown by experiments, while the evolution of heat ceases. This state might be referred to the action of a poison on the brain; but the history of cholera shows that heat is evolved at a time when the circulation was almost subdued, and when the reddening of the blood did not appear to be effected. Precise thermometrical observations are, however, wanted to determine the positive degree of heat. The more natural conclusion appears to be, that the function of the lungs partakes only of that disorder which affects the other

functions, and is not itself primarily affected. Some practitioners have considered the stomach, others the intestines, to be the original seat of cholera. As far as respects the question of these organs being the medium through which the immediate exciting cause frequently acts, and involves the vital functions, the opinion cannot either be controverted or proved; but we are not warranted by any analogy to refer the train of fatal symptoms of cholera to any disorganised or spastic state of those organs, which has yet been brought to light. If the opinion be well founded, the effect must be produced, we would imagine, by the action of something deleterious on the nerves of these organs, or by a diseased state of the nerves themselves. Cholera has been defined to be "a peculiar, violent, spasmodic contraction of the capillary vessels of almost the whole body; but particularly the skin, and its continuation, the lining of the alimentary canal." No reasoning whatever in explanation of this theory has been offered.

Prognosis.—In our prognosis we are guided principally by the type or form which cholera has assumed, and by the period which may have elapsed from the commencement of the attack. If the case should present *apparently* violent symptoms, such as great irritation of the stomach and intestines, much pain in these parts, and severe spasms of the muscles; if there be a natural, or perhaps increased strength of pulse, a tolerably natural temperature of skin, and if only a short time have elapsed from the invasion of the disease, the prognosis will be favourable: these cases are generally found to be much under the influence of curative means. It has not been ascertained how long the system is capable of supporting, unaided, the symptoms noticed above; but it is the concurrent opinion of all practitioners, that the loss of two or three hours, in any case, always greatly enhances the danger.

If, on the contrary, the case should present but few

symptoms of excited or increased actions; if there be little or no pain; if vomiting or purging should either not have appeared—or, having appeared, should have soon ceased, without any improvement in the condition of the patient; if there be little or no spasm, but, along with these negative appearances, if there should be collapse, coldness of the surface, deafness, and great depression of the circulation, the danger is imminent indeed. This awful state of things occurs, in many instances, from the first few minutes after the invasion of the disease: in the majority, however, it takes place only after a more considerable lapse of time. In all cases where symptoms of that description are once present, the formidable nature of the attack is established. The danger of delay, therefore, lies mainly in the chance of this state of collapse being formed before the practitioner sees his patient; but, even under these untoward circumstances, there are proportionate degrees of danger, the prospect of recovery becoming more and more remote, according to the period of their previous duration. The danger of cholera may thus be said to be manifested, not by the violence of morbid actions, but by the diminution or cessation of natural actions. The cessation of the former, likewise, cannot be held to be favourable, unless accompanied by an improvement in the latter. The most favourable of all symptoms is the restoration of the pulse, and without that no reliance can be placed on any other sign. If, along with the restoration of the pulse, the heat of the surface gradually returns, the uneasiness and anxiety lessens, and the natural secretions begin to appear, the safety of the patient is pretty well assured, though he may be still liable to suffer from morbid associations, as well as from relapse.

It must be acknowledged that cholera is a disease so fraught with danger, that, in our prognosis, we are often miserably disappointed. We are never sure that on some sudden, and often hidden movement in the system, or some

slight imprudence of the patient, the pulse may not at once sink, and death ensue. There can be no cases more embarrassing than those in which there shall exist some unequivocal mark of the disease; and yet the system in general remains so little disturbed, for a time, that not only the unfortunate patient is deceived in respect to the disease under which he labours, but even his medical attendant admits the conviction with reluctance; while, from the evidence of his experience, he is too fully sensible that these slow, insidious, and seemingly mild attacks, are of all the most unmanageable.

Method of Cure.—In no disease has the sovereign efficacy of numberless specifics been more vaunted, and in none have the utmost efforts of the medical art been more frequently insufficient, than in cholera; for while the tendency of the disease is, in almost every case, towards a fatal termination, there is yet a certain stage at which its progress may, in very many instances, be arrested by the most opposite, often apparently by trifling remedies; and after which all our means are too often unavailing. The circumstances which relate to the cure are modified and influenced by time, by the prevailing form of the disease, and by the constitutional idiosyncracy of the patient. It will be admitted that, when we can detect a morbid action of any particular organ, before any lesion of its structure shall have taken place, the cure is comparatively more practicable. The earliest movements in cholera, especially as it first manifested itself in these parts, were generally confined to irritation of the stomach and bowels; and in this stage it is unquestionable that the mere exhibition of an anodyne, a cordial, or an antispasmodic medicine was sufficient, in numberless instances, to stop the progress of the disorder, and to effect a cure. At this period, indeed, it seems probable, that while the epidemic influence was at the acme of its strength, persons with little predisposition were sub-

jected in some degree to its influence, as we know to be the case with medical attendants, who, though proof against an attack of a prevailing disease in its regular form, may still suffer considerable constitutional derangement from inhaling the noxious air of the chambers of the sick. After the first epidemic sweep of cholera over these territories, it was universally acknowledged by practitioners, that the remedies they found so successful in their former practice were almost totally unavailing in the subsequent visitations. This, it is presumed, may in some degree be accounted for by the preceding observation, as well as by the supposition that, on the first alarm of cholera, instances of ordinary vomiting or diarrhœa being considered, even by medical practitioners, as cases of that disease, were treated accordingly, and enumerated as cures.

The general symptoms of cholera being so strongly marked, the indications of cure on its first appearance were, by almost universal consent, no less distinctly laid down—namely, to moderate and subdue inordinate actions, and to support or restore depressed actions. As all these actions bore reference, apparently, to functional rather than to structural derangement, the same means naturally suggested themselves to the great body of practitioners; but it was soon found that the indications of cure could not be accomplished by the remedies prescribed. From this period a great diversity of opinion and practice arose: many empirical remedies were brought forward to notice, while the essential differences in the prevailing types of the disease, at different times and at different stations, contributed not a little to distract the minds of medical men; and it has been only in later times that the necessity of treating the disease on general principles has come to be felt and acknowledged.

In prosecuting the remarks on the method of cure, it would have been most convenient to follow, generally, the order of the indications already noticed—offering such par-

ticular observations as may occur on some of the most important of the remedies proposed; but the nature of many of them is such, that they are necessarily resorted to in our endeavours to fulfil the indications both of moderating the inordinate actions, and of restoring the suppressed actions. We cannot, therefore, strictly follow that order in treating the subject of cure.

Opium.—The first remedy that was indicated, in the view of calming gastric irritability, and of subduing spasm, was opium, either in a solid or liquid form; and no other medicine has been so universally employed, or has so fully upheld its reputation, in the treatment of cholera. In the greater proportion of the cases of natives, when given at an early stage—that is, before collapse has come on—and probably also, though less certainly, in a considerable proportion of European cases under similar circumstances, full doses of opium have unquestionably been attended with the most decided success. The native constitution, from the general simplicity of the mode of living, seems more susceptible of the appropriate effects of remedies, and less prone to run into complicated morbid actions, than the European; for when the opiate proved curative, as it did in almost all simple cases, the cure was at once complete, and the patient, in a short time, returned to his ordinary labours. This was very seldom observed to be the case with Europeans, whose different mode of life render their constitutions less susceptive of the full impression of the opiate, and more prone to run into other states of disease.

Considerable diversity of opinion prevails in respect to the doses of this medicine; and it does not appear that the subject has been considered with very strict attention to any physiological doctrines. From 80 to 100 drops of the tincture, and two or four grains of solid opium, would seem to have been the quantity most commonly exhibited, as the first dose; but it has been frequently given to the extent of

two and three drachms of the tincture. Some practitioners went on increasing the doses, if their patient did not experience relief; others also persevered, but with diminished quantities; and others repeated the doses they commenced with. The medicine was generally exhibited without attending much to the aggregate quantity taken; the practitioner being guided only by the effects. It has been usual to prescribe the first doses of opium in the form of tincture, and afterwards in a solid form—either that of pills, or of a soft paste: these, by their more easy retention in the stomach, and gradual solution, certainly promise important advantages. Opium has been so largely and indiscriminately used that we are not enabled to determine its real effects, in all the stages of cholera, in comparison with any considerable number of cases treated without that medicine. A few, but very few practitioners have, indeed, abstained altogether from its use; and others have used it in sparing quantities, especially as to the repetition of doses: but the practice has not been distinguished by any particular success. This much must, however, be admitted, that the recoveries which have taken place *without* the use of opium, afford proof that it is not so absolutely indispensable as some have alleged.

While, as an anodyne and antispasmodic, the efficacy of opium in the cure of cholera has been proved by experience to be great, it is painful to be obliged to acknowledge that, in many apparently promising cases, where even its narcotic effect was evident, it had no ultimate effect in warding off a fatal termination; and in the advanced stages of the disease, whether it was first exhibited at that period, or whether its use may have been begun earlier, and then continued its efficacy in restoring the depressed or suspended functions, like that of all our other remedies, is extremely uncertain. Those cases may, with most confidence, be chiefly trusted to the effect of opium, in which the primary symptoms are seated, apparently, in the stomach, as indi-

cated by vomiting, and spasmodic pain in that region; and in the intestines, as indicated by violent purging, and painful contractions of the abdomen. Its effects are more uncertain where the affection of the stomach is obscure; where there is a moderate, but insidious purging—where there is a great sense of heat in the epigastrium, and in every case where collapse has come on. The practice of persevering, to the last, in the use of large doses of opium, under all the variety of symptoms which cholera presents, has been, in the main, unsuccessful; while even the recoveries which have taken place under such circumstances do not appear distinctly referable to the action of that medicine. Opium, therefore, is by no means a specific in the cure of cholera; but it is an auxiliary of the first importance. It should never be omitted in the earlier stages, and should be made to precede the use of any other remedy that is not given in conjunction with it. When exhibited as an anodyne, or antispasmodic, it should be in the form of tincture, and to the extent of 60 to 100 drops, repeated according to circumstances; when given as a cordial and stimulant, which will generally be the indication, after the inordinate actions are allayed, the form of a soft pill or paste is preferable. The solution being gradual in the stomach, the quantity given at once may be three to five grains. If the tincture be given with these views, the doses should be small, and repeated at short intervals.

Æther, Ammonia, &c.—To answer intentions similar to those which lead to the use of opium, æther, ammonia, camphor, castor, musk; the essential oils of peppermint, clove, and cinnamon; various tinctures, all combining aromatic and highly stimulant ingredients; bitter tinctures, the drogue amère, &c., have been very generally employed. Moderate and well-timed doses of any of these medicines, singly, or in conjunction with opium and calomel, have unquestionably been found eminently useful; but, like opium, the period

during which their employment can be depended upon, as holding out a tolerable chance of success, is extremely short, and may be considered to be chiefly comprised in that which precedes organic lesion of the first principal passages, or their functional atony. A perusal of the reports will show to what extent the use of these remedies has been carried, and the indifferent success attending the practice in its extreme limits. It has been very distinctly remarked by many practitioners, that the use of these remedies was often extremely ungenial to the feelings of the patient, especially those who suffered much from thirst, from burning heat, and fixed pain in the region of the stomach; and to have been productive of aggravated distress. After a certain interval it was obvious that the stomach was no longer sensible to their action.

Spirits and wine.—Ardent spirits and wines have been exhibited by almost every practitioner; and, indeed, it is impossible to look upon a patient ill with this disease, without feeling at once a disposition to employ them, even largely. It soon becomes manifest, however, that the excitement of stimuli is insufficient, by itself, for the cure of cholera; the fatal symptoms too often come on under the most careful and assiduous use of this description of remedy; and after the stage of collapse is formed, their exhibition is but too frequently altogether unavailing in rousing the energies of the system. Nearly the same remarks apply to the use of wines and spirits, as to the use of opium, and the other medicines mentioned above. In the early stages, they are of acknowledged utility; in the advanced stages, they, like other remedies, too often fail. The extent to which they should be given has not been sufficiently considered, with a reference to the actual state of the patients, and to the laws of excitement, as far as they are generally understood and admitted. If the collapse in cholera be the effect of a direct diminution of the

capability of an organ to be affected by stimuli, we should commence by doses large in proportion to the supposed degree of this diminution; and we should decrease them according to the progress made in restoring excitability. But if the collapse be merely owing to a want of natural stimulus, the doses should be small in the commencement, and increased gradually. Most practitioners appear to have decreased the quantities of spirits, after the first doses, from which we may infer, that they considered the state of collapse as the result of a *diminution* of excitability. It is difficult to decide upon the comparative merits of the question, or the respective benefits of either mode of practice. Some few practitioners have abstained altogether from spirits or wine, looking upon the disease as fundamentally inflammatory. The success of this practice has not been such as to give it any claim to preference over a moderate use of those remedies.

Calomel.—Calomel has been used almost as indiscriminately as laudanum for the cure of cholera. Different indications, however, have been followed by medical practitioners, in the adoption of this medicine. Some exhibited it to quiet the irritability of the stomach; others to emulge the biliary vessels; some regarded it as a powerful mean of restoring the lost balance of the circulation, and of subduing inflammation; a still greater proportion have not explained their views at all. With respect to the supposed quality of quieting the irritability of the stomach, there seems abundant proof that, in cholera at least, calomel does not possess it; but, on the contrary, it was, when judiciously observed, very often found to have quite an opposite tendency. It is now pretty generally admitted, indeed, that mere irritability of the stomach is not in itself a symptom of dangerous import; and that, if the medicines given to check it have no other concomitant effect, the result is by no means advantageous to the patient.

The effect which calomel, in large doses, is generally said to have in allaying the irritation attendant on certain inflamed states of mucous membranes, has probably led to its employment as a sedative in the irritations accompanying cholera. It is perhaps also fair to infer, that being a medicine of acknowledged great powers, its use, once admitted, was in numberless instances resorted to merely as a matter of practice, which it might be questionable to omit. This inference is strengthened, when we consider the mode in which calomel was at first almost universally administered in cholera; from 15 to 20, generally 20 grains, of the dry calomel being placed upon the tongue, it was "washed down by 100 drops of T. Opii!" Surely this form of exhibition could hardly have occurred to the profession in general, as being suitable in a disease like cholera. We would rather apprehend that the remedy, and the way of giving it, were taken up without due consideration. If it be urged that the object was the speedy diffusion of the calomel over the surface of the stomach, the same end might have been attained by suspending it in some mucilaginous fluid.

The quantities of calomel administered in this and other modes have been great. The stomach having often lost its power of rejection, this substance has been found coating its internal surface, and, when given in boluses, lying imbedded in greenish mucus, marks of inflammation being visible on the spot. The success of those practitioners who did not use calomel in the primary treatment of cholera, has been fully as great as that of those who did; while the arguments distinctly brought forward by various medical officers against its *early exhibition*, appear decisive against the observations which have been offered in support of the practice. Calomel has unquestionably a powerful effect in exciting the biliary system, and in this view its exhibition is highly necessary; but the suppression of the excretion of bile being only a link in the common

chain of symptoms, and its partial or occasional removal, or even its total absence, having been proved to be of little consequence in the general course of the disease, to attempt to excite it by particular means may be considered as premature and injudicious. Whenever a favourable change takes place, indicated by the renewal of the *ordinary* functions, then the exhibition of the appropriate stimulus seems to be clearly indicated, and not till then. We do not, of course, here mean to include the *vital functions*, whose condition must form the primary and main object of our practice. Calomel is not a remedy that can lie altogether passively in the stomach, while that organ retains its vitality; if it does no good, it will do harm. Cholera has been frequently said to bear much resemblance to congestive typhus. It is probably from this analogy that calomel has been exhibited in cholera as a restorer of the balance of circulation; or those who embrace the doctrine that the disease is of an inflammatory nature may expect the same benefit from its use, which is derived from it in an over-excitement of the circulation. Even allowing, however, that venous congestion, as in typhus, or excited arterial action, as in hepatitis or enteritis, are equally under the curative influence of calomel, is it fair to conclude that the affection of the circulation in cholera is essentially allied to either of these states? It would seem not: the affection of the circulation in cholera, more probably, has its origin in some sudden functional impression, of a nature on which calomel, to say the least, can hardly be supposed to possess that rapid and direct influence which is requisite in the cure of the disease.

Bloodletting.—The abstraction of blood, unless as an anti-spasmodic, is a remedy so little indicated by the usual symptoms of cholera, that its employment in the cure of this fatal disease has afforded a signal triumph to the medical art. It requires no common effort of reasoning or

reflection to arrive at the conclusion, that when the powers of life appear depressed to the lowest degree, the pulsation of the heart all but extinct, the natural heat of the body gone, and the functions of the system suspended, and incapable of being revived by the strongest stimulants, the abstraction of blood might yet prove a remedy against a train of symptoms so desperate. Bleeding was no doubt first employed in cases where there was much spasm, and where the powers of the system had not much declined; the relief was generally obvious and immediate, and the practice in such instances was thus established. Dissections having frequently shown a loaded state of the vessels of the viscera, and apparent inflammation of their mucous membranes, venesection was also adopted to obviate these conditions, and naturally enough: but the employment of bloodletting, without reference to either of these states, and as a remedy for collapse in cholera, must have been the result of reasoning and reflection, founded on the general principles of the science; a result highly honourable to the profession, and, as we shall endeavour to show, of the utmost practical importance in the cure of the disease.

We have no precise information regarding the manner in which venesection was performed in general, although, in such a disease, this seems a matter of very considerable consequence. It is remarkable that, in a disease like cholera, syncope should be so rare a symptom. When it is brought on by venesection, it is generally favourable, which may most probably be imputed to its being employed during violent spasm, and before any sinking has taken place. We can then readily understand that the free evacuation of blood, which may be supposed to precede the syncope, as well as that state of relaxation itself, will be followed by amendment; but there is no information which can lead us to believe that syncope has often followed the abstraction of *small* quantities of blood, or that success had followed small bleedings. The usual expression is,

that after a scanty discharge of blood, it ceased to flow, and that depression of pulse, with *faintness*, not *syncope*, came on or was increased. We are not informed whether bleeding has been generally performed in the recumbent or half-erect posture. It is evident from the reports, that the mere act of elevating the body has been followed by faintness and even death; and if venesection has been often attempted in the half-erect posture, we may thence account in some measure for the frequent want of success in obtaining blood.

Few remedies, on a fair trial, have been more generally and unequivocally advocated than free bloodletting; and the most that has been urged against it is, that it is not always successful. The advocates for bleeding proceed however, on the principle, that a certain quantity of blood is to be obtained, in order to insure success, which few of them estimate at less than about 30 ounces. Those who are disposed either less favourably towards bleeding, or to condemn it altogether, object, that if the circulation is in a condition to admit of free bleeding, the case is a mild or favourable one, and would probably yield to other remedies. There is no doubt that fatal collapse has sometimes suddenly followed even *large* bleedings, which has staggered the faith of many practitioners in the general safety of the remedy; but in the great majority of cases it is after *small* bleedings that this has happened. There is the most ample evidence also, that cases, especially in Europeans, even under the most favourable appearances, will often, in spite of all internal and external remedies, go on to a fatal issue, when bleeding is not practised.

The cause of collapse coming on after, or during bleeding, in cases of cholera, may perhaps be explained so as to obviate the objections thence arising against it as a remedy in that disease. It seems unquestionable that the evacuation of a small portion of blood—such, for instance, as we might suppose to be yielded by the remoter branches of

vessels, is followed by increased debility; but if we succeed in carrying on the evacuation till its effects reach the internal vessels and the heart itself, *then* the circulating system seems to be freed from an oppression which impeded its functions, and it becomes equal to the task of propelling the mass of blood. This is a species of indirect excitement. The powers are not raised, but the resistance or weight is lessened. Such is the theory which has been adduced in support of bloodletting in cholera. The reader will be aware that it is not new, its application to the particular disease of which we are now treating being the only novelty. *If the theory be true, the presence, or the supervention of collapse, so far from deterring us from going on, should only be regarded as additional reasons for renewing our efforts to get blood.* In proof of this, the following remarks, drawn from the journals of medical officers whose testimony must be allowed to have the greatest weight, are adduced.

Mr John Wilson, (p. 260,*) in the case of Mootien, where the pulse had long ceased to be distinguishable at the wrist, abstracted twenty ounces of blood on the supervention of oppressed respiration. The blood was of the darkest colour, very thick, and was obtained with the greatest difficulty. The patient had been ill about twenty hours; for at least twelve of these he had remained without pulse at the wrist; that is, from the time he entered the hospital. Yet, within ten minutes after the bleeding, the pulse was distinguishable; it soon began to rise, and the patient recovered. In the case of Vencanah, (p. 261,) the pulse had likewise disappeared; there was deafness, laborious respiration, and every bad symptom: he was bled to twenty ounces, with great difficulty; the blood was of the darkest colour, and extremely thick. "Immediately after the bleeding, he breathed much easier, and his pulse at the wrist could be faintly felt." The patient recovered. In the case of Cap-

* These numbers refer to the pages in the original report.

tain D., which follows that of Vencanah, bleeding was practised at a very late period, when, from the congested state of the lungs, by which, it would appear, their structure was disorganised, no plan of treatment would probably have succeeded.

Mr M'Leane, 84th Regiment, in the case of Broomhead (p. 263).—"$\frac{1}{4}$ to 8 A.M. P. now 120, very weak :" bled to 1 lb.—"9 A.M. P. continued low after the bleeding." "$10\frac{1}{4}$. P. not perceptible at the wrist; is covered over with cold clammy perspiration :" bled to 8 ounces. "$\frac{1}{4}$ to 11. P. felt in a very slight degree at the wrist." This case terminated fatally at 5 o'clock; but the pulse at 2 P.M., though still very feeble, had fallen to 80. Even in this case, where the first bleeding was only to a pound, and the second to half that quantity, the system appears to have made considerable effort towards restoration of the circulation.

Mr M'Cabe, Poonamallee, in the case of Greenfield, (p. 265).—This case appeared to be going on well for about twelve hours, when a violent return of the symptoms led to the abstraction of twenty ounces of blood, with immediate relief: and the skin became warm, and the pulse stronger. In the case of Howard, (p. 266,) while the pulse was "extremely feeble," he was bled to thirty ounces on the occurrence of urgent symptoms, and with immediate relief; three hours after, the "pulse was full, and heat of skin nearly natural." In the case of Fife, when the pulse was "quick and rather tense," fifty-five ounces of blood were drawn, with entire relief. Some hours afterwards he had a recurrence of symptoms, "pulse small and quick, surface warm;" thirty ounces were again abstracted, with the same advantage. "P., for nearly four hours from this time, was not perceptible, and his feet and legs became cold." The pulse, however, returned, and he did well.

Mr Maclean, 53d Regiment, in his remarks on three cases where the abstraction of blood was decidedly successful, observes, (pp. 269, 270)—"I have no hesitation in saying, that even in the very last stage of the disease, in the

robust European and also the enfeebled native, bleeding should form a principle in our ratio of treatment; no sinking of the pulse or general appearance of debility should deter us. They are the consequences of over-action, from the consequences of an undue quantity of blood being thrown on the abdominal and thoracic viscera, which are relieved by removing the cause. I am of opinion with Dr Jackson in saying, that, by diminishing the quantity of blood, you increase the power of the circulating system."

Dr Daun, 89th Regiment, in the case of Murdock, (p. 271,) the pulse being "weak and irregularly intermitting," bled to thirty-two ounces;—"he appeared to revive in proportion as the blood flowed, while his pulse at the same time rose in strength and size." Some time afterwards his symptoms recurred: "pulse intermitting, and has become again weak; skin moist and cool; the venesection, in consequence, has been repeated, and thirty-six ounces more blood have been abstracted, the pulse continuing to rise all the time, and the patient expressing himself to be relieved in even a still greater degree than he had been by the first bleeding." Dr Daun farther observes—"So far as my experience enables me to form an opinion, bleeding—*early and copious* bleeding—is the only means of cure yet discovered on which any reliance should be placed." "In two cases, the pulse, about twenty or thirty minutes after the first bleeding, which was to the extent of thirty-two ounces, began to sink again, and to intermit, and the cold perspiration and indescribable anxiety peculiar to the disease, to return. The vein was in both cases again opened, and greater relief was discovered from the second abstraction of blood than from the first; an equal or even a larger quantity of blood being lost by the second than by the first bleeding."

Mr Annesley, Garrison Surgeon of Fort St George, in the case of Sparling, (p. 277,) while the pulse was small, frequent, and very weak, bled the patient, though with difficulty. "When sixteen ounces were drawn, she had a

return of the spasms, and the blood ceased during the continuance of them:" after the spasm had subsided, the "pulse very weak and small, sixteen ounces more of blood were drawn, and with great relief. Though covered with a cold dew, she feels no sensation of faintness; and the blood having now changed to a more natural state, six ounces more were allowed to flow." Her pulse, at half-past ten, was "softer and fuller, and 96 in a minute." Mr Annesley also observes, "I have succeeded in almost every instance of bleeding, when it could be practised"—alluding to the difficulty of drawing blood: and again, "in place of syncope being produced by bleeding, in the cases which I have treated, the pulse has invariably improved, and the feelings of faintness and debility disappeared."

Mr Wyse, Garrison Surgeon of Trichinopoly, (pp. 232 and 233,) observes—"Nine or ten patients (natives) had died very suddenly, who were treated with large doses of laudanum and calomel, stimulants, frictions, and blisters. In my last visit, two patients were ill; one had just been seized, the other had been sick for ten or eleven hours. The pulse was very obscure in both, but scarcely perceptible in the latter. The blood flowed freely, and of natural quality, from the former, who, after the operation, wished to join his comrades at work; from the other, six or seven ounces of thick tar-like blood were drawn with difficulty, but with much relief to the præcordial oppression, and he returned to work in two or three days." Again, at p. 229, in the case of M'Namara, he observes—"He fell into syncope while I applied the bandage for venesection; but I was not deterred, trusting to my former experience, that if blood could be drawn he had a chance, and the only chance, I may say, of resuscitation."

Dr Irving, Golundauze Battalion of Artillery, (pp. 280, 281,) in the cases of four natives, bled when the pulse was, in the first, "very quick, small, and tremulous;" in the second, "pulse not perceptible at the wrist;" in the third,

"pulse 118, small, and rather weak;" "pulse falling off;" and at last, "pulse hardly to be felt;" and in the fourth, "pulse at times not to be felt," along with all the usual signs of collapse; yet in each of these cases, blood being obtained, though with great difficulty, the circulation was set free, and the patients recovered.

Besides the very ample evidence, which will be found in the printed reports, in favour of bloodletting as a remedy in cholera, the opinions of the majority of medical officers whose observations are not inserted, are also decidedly in its favour. The objection chiefly urged is not against the practice, but rests on the too frequent impracticability of procuring a sufficient quantity of blood. It is acknowledged, even by the most zealous of its advocates, that this difficulty has often occurred, and proved insuperable. When, however, the operation is performed with the moral conviction that, if successful in obtaining blood, the life of the patient will most probably be saved, the operator will persevere undiscouraged in his efforts; he will call in every suitable aid, such as frictions, bathing the arm in hot water, reopening the orifices of the vessels, administering stimulants, and external warmth. He is not deterred and induced to desist by any intermediate accession of debility or collapse; nor is he tempted to rest satisfied with any temporary melioration of pulse: his object goes beyond the present moment; and he feels satisfied that, if he can fully unload the internal vessels, he will save his patient, and if he fails, that he will most probably lose him. It is not considered to be of much importance whether the patient may have been bled before or not, if his present symptoms indicate a repetition of the operation. The principle is, that collapse, in cholera, is not the consequence of the loss of blood, but is a condition which nothing but its abstraction can be trusted to for relieving. In the second case, however, when the medical man is not decided in his own mind, obstacles will be allowed to subdue his fortitude,

and arguments will be thence deduced to dissuade him from perseverance. A sudden aggravation of the symptoms of collapse will be regarded as an effect of a remedy at least doubtful; or a transient return of vascular action will be held, either as a sufficient advantage gained, or as an indication that bleeding is no longer required. It is thus we may account for a vast number of ineffectual, because undecided, attempts at bloodletting, and for a vast number of unsuccessful results when the quantity abstracted falls short of that which is required; for the volume of the blood must be reduced in a given proportion, in order to secure the effects expected from it. Anything short of this will only take away from the patient's strength, and not augment the motive powers of the circulating system, or, what is the same thing, will not diminish the resistance to the motive powers.

Cholera is unquestionably a very dangerous disease, and so many circumstances concur in aggravation of its natural fatality, that we can scarcely hope that any mode of treatment will ever be devised which shall strip it of its formidable character. Much injury has arisen, however, from remedies being brought forward, and tried, as if they were absolutely specific and infallible; and amongst others, bloodletting has been put to this most unjust and unphilosophical test. If strictly considered, it would perhaps be the least of all entitled to the appellation of a specific remedy; for in truth there is great reason to doubt whether it be directly curative of the essential symptoms of cholera. Its warmest advocates only consider it as an auxiliary, and never trust to it but in combination with other, and which indeed appear to be the strictly appropriate remedies. Congestion, for which alone it is indicated, appears merely to be a symptom or consequence of that morbid state which forms the first and highest link in the train of choleric actions. The removal of congestion, which is mechanical, allows the heart to respond to the action of the

other remedies. Should it be objected, from a consideration of some dissections, that no particular congestion had taken place, the blood appearing to be equally diffused over the vascular system; and that in some instances, the circulation, though ultimately affected, seems to retain its powers for a time without material depression; yet even in such cases venesection, by lessening the volume of the blood, may still have beneficial effects. We should certainly apprehend no danger from it in cases of this description, used, *as it ought invariably to be, in conjunction with the other remedies.*

The medical board, in their circular letters, have advised the exhibition of antispasmodics and stimulants *prior* to the use of the lancet. By this means time is saved, and, what is perhaps even of still greater importance, the effect of the bleeding and the action of the internal remedies are made to co-operate.

The abstraction of blood by leeches or cupping appears, from the testimony of most medical men, to be nearly as uncertain as that by the lancet, and obviously from precisely similar causes. The attempt at topical bloodletting may always, however, be resorted to as affording some chance of success when venesection fails. The chest or belly will readily be admitted to be preferable to the extremities for the application of leeches or cupping; and we may be farther guided by the seat of any particular pain. Perhaps the neighbourhood of the spinal marrow might be preferred.

With regard to the particular vessels which should be opened, as well as to the propriety of drawing off the blood quickly or slowly, when we have the option, the question appears unimportant in any pathological view. The chief point is to get the requisite quantity of blood; and it will readily occur to the practitioner, that whatever vessel he may open, the flow of blood will be most certainly facilitated by studying the circumstances of the

patient. He should be laid in a recumbent and easy posture, be well supported by cordials, and, if inclined to vomit or purge, contrivances should be adopted to permit these evacuations to be effected without altering his position.

External applications.—The next remedies we shall notice are those which are applied to the surface of the body. The extreme coldness of the skin, and the frequency of spasms in the muscles, which distinguished cholera, especially on its first invasion, immediately suggested the idea of the warm bath. Such additions as might be supposed to add to the efficacy of the common water-baths—namely, spirits, aromatic herbs, and common salt—were likewise recommended. The efficacy of these baths was not immediately questioned, but their preparation was necessarily at all times tedious. It was attended with difficulties in every situation, and in many it was altogether impracticable. Bathing, moreover, could never be employed without much fatigue to the patient. A succedaneum was then proposed, since well known by the name of Mr Dalton's spirituous vapour bath, which at first sight seemed to promise the most important advantages from the facility and expedition with which it was prepared, the powerful warmth produced, and the ease and comfort to the patient in the mode of its application. It was soon found, however, that both the aqueous and vapour baths disappointed the expectations which had been formed of them. When there was much spasm with tolerable vascular action, the warmth and moisture gave relief; but, in the formidable cases, attended with a cold, wet skin, and a depressed circulation, it became quite manifest that little or no advantage ensued in general from their use, nor was the temperature of the skin in any considerable degree restored by them. In these terrible cases, a very curious symptom was almost constantly developed—that of the

patient feeling even a moderate degree of heat to be scalding and intolerable, while his skin was deadly cold.

It was now considered that the application of moisture to the skin in that condition, and the exposing of the patient to the inhalation of air loaded with vapour, while his lungs were evidently in a condition little capable of performing their functions even in the purest atmosphere, was at best very questionable. The application of external heat, allowed to be indispensable, ought rather to have been conjoined with such measures as might tend to repress the profuse cuticular discharge than to promote it. Accordingly dry heat, technically so expressed, had been pretty generally substituted for the aqueous and vapour baths, even before the medical board had ventured an opinion against their utility in cholera. The customs in this country afford great facilities in the application of heat; every European, and almost every native house affords a small couch with rattan or corded bottoms; one or more chatties, or earthen vessels, which are always at hand, being filled with burning charcoal, also readily procurable, and placed underneath the couches, is found to afford any desirable degree of heat. The use of long bags made of flannel, or of cumbly or Indian blanket, and loosely filled with heated sand or heated salt, has likewise been much and deservedly extolled: part of the good effects of these heated bags may be imputed to their absorbing the moisture as it arises on the skin. Strong frictions with the flesh-brush or warm dry flannels has been found a very important addition to our means of cure.

Frictions, rubifacients, &c.—The use of friction with stimulating tinctures, and of acrid embrocations composed of garlic, capsicum, &c., has been occasionally resorted to, but their stimulating effects would appear to be counterbalanced by those of their evaporation. As a means of general excitement, sinapisms have been used; but not

perhaps so frequently or extensively as their usefulness in some instances would warrant. In particular, sinapisms do not appear to have been resorted to as one of the *early means* of cure; so that, when they have taken effect on the skin, their action on the system has been too often obstructed by the progress made by the disease, or the skin itself has become insensible to their operation. Sinapisms, largely applied to the surface, and in proper time, hold out the prospect of a considerable and permanent excitement, and their early application is recommended to the serious notice of medical practitioners. With similar views, and as topical counter-irritants, vesicatories, composed of cantharides-plaster, or that plaster with the addition of the oil of turpentine, mineral acids,* and boiling water, have been pretty extensively employed.

The state of the skin, however, especially when the disease is advanced, is very frequently such as to render the action of vesicatories extremely uncertain. Even the strong mineral acids frequently fail in producing any lively impression: in these desperate states, boiling water has been had recourse to, and with effect; and there is no readier or more powerful vesicatory. The application of the various remedies of that nature to the skin, especially over the regions of the heart, the stomach, or the intestines, has been found to be of manifest utility, if employed while the skin is susceptible of their action. There appears sufficient

* The term blister has been improperly used in this instance, as the acid does not vesicate the parts to which it is applied, but acts on the skin like a cautery. See remarks on this subject, page 250. If the acid be at the specific gravity of 1,300, and if the skin of the patient retains its vitality in any considerable degree, a mixture of two parts of acid and one part of water will generally be found of sufficient strength. The acid, thus diluted, is to be applied to the skin by means of a feather. If the skin becomes immediately discoloured, (in Europeans it will assume a straw colour,) and if the pain produced be sharp and *burning*, the application may be considered as having succeeded, and the part should immediately be sponged with tepid water; or the acid may be previously neutralised by the application of an alkaline solution. When we find that neither discoloration nor pain follows the application, the acid is to be used without dilution. The sulphuric acid may be also used, especially when we find the nitric acid fail.

evidence in many cases of their immediately rousing the sinking powers of life, when every other remedy had failed.

Emetics.—Emetic substances, especially the tartrite of antimony, have been used in cholera, and not without success. The indications which guided practitioners in the exhibition of emetics have been either to empty the stomach, or to determine to the surface. It appears certain that the stomach very frequently does not possess the power of evacuating its contents in cholera; the vomiting, or effort to vomit in such cases, is described as a sort of convulsive gulping, in which the lower part of the æsophagus seems chiefly engaged. The contents of the stomach can neither be ejected, nor can articles swallowed enter the cavity of the stomach; they are apparently spouted up before they reach that organ. This condition is probably the precursor of that of complete atony. Now, although we cannot well conceive that the mere evacuation of the contents of the stomach can be of any importance in this disease, yet it will readily be admitted, that the excitement of what may be termed the natural and healthy action of vomiting, may prove favourable,—at least, that it is a condition preferable to the semi-atonic state just described.

Even when the atonic state of the stomach appears to be established, and the various stimulating, cordial, and antispasmodic remedies have no effect, it may still, amidst a choice of difficulties, be deserving of serious consideration, if not of trial, whether the exhibition of emetics, especially of a medicine possessing such power as the tartrite of antimony, might not produce some effect. It must be owned, indeed, that the practice of giving tartrite of antimony in cholera, has been subsequently abandoned by those who at first were most zealous in its support; but the grounds of this abandonment are probably referable to the disappointment of a too hasty and sanguine expectation of success. The use of sudorifics—that is, of emetic substances

conjoined with opium—comes recommended by more precise arguments. Their visible effects in causing perspiration would not indicate their employment in cholera; but their assumed action, in determining the blood to the surface, which we suppose to be the precursory cause of the perspiration, is a most important indication. Those who have employed sudorifics with these views, speak favourably of the practice. It will be highly desirable to obviate the nauseating effect of the emetic substance,—an effect, it is believed, generally accompanied with a *cold* perspiration: the proportions of the emetic and the opiate should therefore be regulated in the view of determining to the skin, without nauseating the patient. The pulvis antimonialis, or James's powder, might answer this indication better than any other preparation of antimony.

Purgatives.—When practitioners first observed the nature of the dejections in cholera, they not unfrequently imputed the absence of fæcal matter to its *retention* in the intestinal canal, and under this persuasion they resorted to purgatives. Others, though they knew that the fæcal contents of the intestines had been discharged at the first or second evacuation, and that no more was formed during the disease, still were of opinion that the action of a purgative might supersede the choleric state, and thus aid in restoring the functions of that important canal. Accordingly, purgatives of various kinds, especially the cathartic extracts and calomel, have been administered with this intention. The practice still has its supporters, and merits farther observation and trial. There is one purgative, namely, castor oil, in the use of which a considerable degree of empiricism has obtained, occasioned probably by the very positive manner in which its virtues have been extolled. This medicine, in doses of half an ounce, combined with 15 to 20 drops of laudanum, has latterly been used in cases of natives, with very considerable success,

by some medical officers; and there seems sufficient evidence in its favour, when given in this way, to warrant a farther trial. Oil of turpentine has likewise been exhibited, but not so generally as to afford ground for forming any conclusive opinion regarding its merits. Being possessed both of a stimulant and purgative quality, it would seem deserving of farther trial.

The necessity of giving purgative medicines, in order to obviate some of the sequelæ of cholera, has been generally recognised. The proper periods for their exhibition have been variously laid down. Those who are disposed to argue favourably of their general effects in the disease, prescribe them early, and in combination with their other remedies. Those who regard them as being useful in the sequel only, defer their exhibition. The choice of the purgative is a point of much more importance, probably, than the period of its administration. A formula, comprising medicines possessing bitter and carminative qualities, conjoined with a purgative of which the effect is not a watery purging, is considered to be the most safe and advantageous. The infusion of senna, with gentian, or ginger, or cardamoms—or the senna infusion, with the tinctures of any of these articles—the drogue amère, which is a tincture of aloes, myrrh, benzoin, &c.—the various cathartic extracts—in short, any purgative possessing the general properties of those enumerated, together with a moderate dose of calomel, either in combination with the purgative, or exhibited some hours before it, have all been employed, and with adequate success and advantage.

Glysters.—Glysters were more frequently used when cholera first made its appearance, than they have subsequently been. There is not, indeed, sufficient evidence to enable us to judge of the general applicability of the practice to this disease. When the object was to arrest purging, glysters containing opium, either in the form of tincture or

watery solution, were frequently administered. Glysters containing oil of turpentine have likewise been exhibited, with the view apparently of stimulating the intestinal canal, or the system at large. The medical practitioner, who is guided by the general principles of his profession, will be at little loss to determine when, from particular symptoms, the use of glysters in cholera is indicated.

Magnesia and other remedies.—Magnesia combined with milk, another of the empirical remedies, has caused considerable discussion: several instances will be found in the original reports and cases, in which its use seemed to be attended with advantage; but there is no doubt, from the evidence in possession of the Board, that it can merely be ranked as an adjuvant, and that only of very limited powers. The impaired condition of the respiratory function has given rise to suggestions for the use of oxygen gas and nitrous oxide; but unfortunately there is no case recorded in which either of these gases has been used. A remedy of this nature is certainly very strongly indicated; and although it is inapplicable to general practice, it might yet be highly deserving of trial in particular cases: neither are there any experiments recorded on the effects of the galvanic or electric fluids in cholera. The inhalation of the vapour of sulphuric æther has been tried, and, though on a very limited scale, there appears ground to believe that it may be of use.

We shall only notice one more among the number of empirical remedies which have been brought forward. While many practitioners were anxious in their endeavours to emulge the gall-ducts, and to set the functions of the liver in motion, the benefit of biliary fluid in the first passages was boldly attempted to be attained by administering the bile of animals, chiefly that of the ox. It is almost superfluous to add that the practice, which never had many supporters, was, in the sequel, entirely abandoned.

Various plans of practice have acquired a degree of surreptitious reputation from the maxim, *post hoc, ergo propter hoc;* for there is, as has been already shown, a lessened degree of fatality observable in cholera towards the termination of its epidemic attacks. At the first invasion, all remedies appear to be unsuccessful: they are, perhaps, abandoned; and after various trials of other remedies, equally unsuccessful, recoveries begin at length to take place. These recoveries have been often attributed to the remedy last employed, which, in its turn, is destined to lose its repute when it is subsequently tried in the more severe cases of the disease.

Drinks.—There was no point of practice more universally established by common consent, and yet apparently more questionable, than the interdiction of drinks or diluents in cholera. They were almost uniformly considered to be inadmissable, chiefly on the ground that the stomach refuses to retain them; and that keeping up or doing anything to renew the irritation of that organ should be avoided. But are we to pay no attention to the dreadful feeling of thirst, which forms so general and so distressing a symptom of the disease? and are we to disregard the state of the body, robbed, as it evidently is in most instances, of all its serous and aqueous parts? It certainly would not be safe to trust implicitly to the calls of nature, since the desire is not simply for drink, but for *cold* drink, which practitioners are unanimous and decided in stating to be in the highest degree dangerous, and almost always fatal. The use of bland, diluent, tepid, and even acidulated fluids, was early permitted, indeed by some of our best practitioners, seemingly with advantage. There is reason, likewise, to believe that, during the interval which has elapsed since the first appearance of cholera, a less rigorous inhibition of fluids has gradually obtained; but although a larger portion of drinks is now generally allowed, the absolute

propriety of using them to the extent of dilution has not apparently received that degree of consideration which the importance of the subject demands. The free use of diluents is indicated by the raging thirst which prevails, and by the extent of the discharges, which evidently drain the system of a large portion of its serous or watery parts. They are counter-indicated by the irritable state of the stomach and intestines; and doubts may be entertained of the power of the absorbent vessels, during cholera, to take up any portion of the fluids thrown in, so as to replace in the system what has been wasted by the exhalents. With respect to arguments against the use of diluents, drawn from the danger of their keeping up the irritation of the stomach and intestines, they will not be allowed to have the same weight now which our notions of the disease on its first appearance certainly attached to them: still, however, we should be careful so to time their exhibition, and to proportion their quantities, that they may afford the best chance of relieving the patient, without needlessly provoking the stomach to reject them. Sudden and large draughts ought to be sedulously avoided, and those times chosen for their gradual exhibition when we perceive the patient to be least disturbed by the state of his stomach.

In regard to the state of the absorbents, we can only reason from analogy; and then we should be disposed to say that, in common with most of the other functions, theirs could not be unaffected: but we have no proof of the fact, or the extent to which the affection prevails. The same argument might apply to the propriety of any one of our remedies; and finally, the extreme desire for fluids may be taken as an indication that the absorbent system, which is the source of the desire, is not altogether effete. We observe the same dreadful thirst in all great hemorrhages. We would therefore say that tepid, diluent fluids should be freely, and even largely, given in cholera, especially at the commencement of the attack, where the stomach is yet

active, and that the experience of many practitioners warrants the safety of using drinks, acidulated either with the mineral or vegetable acids.

Food.—In a disease where such great nervous exhaustion prevails, it is obviously of much importance in the treatment to afford the speediest support to the patient by proper nourishment. We may readily combine the first steps of this intention with that which precedes, by using, as bland diluent fluids, the decoctions of barley, rice, sago, or arrow-root, and chicken water, or beef tea: when wine or spirits are administered, it will be advisable to mix them with the diluent drinks, especially with the arrow-root or sago. In the native cases, where *caste* may interfere with the choice of food and drink, rice-water, with a portion of some simple seasoning or very weak pepper-water, will answer the purpose. Though it probably would not be safe, or at least of much avail, to be guided by the sensation of hunger which sometimes prevails in cholera, and which is unquestionably a morbid sensation, yet we should not entirely disregard it. A little food should be given; and if the sensation be relieved by it, or if no obvious ill effects ensue, we should persevere. In ordinary cases, we may begin to give nourishment, independently of the drinks above mentioned, as soon as the disease appears to have yielded; that is to say, when the natural functions are in any degree restored. We should cautiously avoid all substances which are acescent or not readily digestible. Animal soups and jellies, farinaceous and mucilaginous substances, should be first trusted to. The quantities given at once should not be large, lest they oppress the stomach; nor yet should they be too small, and given at too short intervals, for the incessant repetition of minute quantities of food is apt to fatigue and disorder the stomach. Nourishment should be made to stand in room of the stronger diffusible stimuli, and that as soon as practicable. In this

view, we should add spices and carminatives, and adopt, on the whole, a fuller plan of diet than we do with convalescents under other diseases: when, however, evident marks of febrile reaction or inflammatory excitement take place, as sequelæ of cholera, the diet must be regulated accordingly.

Rest.—It is of the greatest consequence, in the treatment of cholera, to husband the patient's strength. All exertion of the muscles of voluntary motion should therefore be avoided as much as practicable. The exhibition of our remedies, and the means of enabling the patient to obey the calls of vomiting and purging, should be contrived, likewise, so as to accomplish these ends with the least possible locomotion. The extreme restlessness which so often prevails in cholera must greatly tend to exhaust the patient, while the cause is probably too deep-seated to admit of any considerable alleviation from external means. The frictions, however, recommended above, may possibly have a soothing and tranquillising effect, though it must be admitted that the whole process is generally diametrically contrary to the patient's feelings. Although his surface be of a deathlike coldness, he calls out that he is burning with insupportable heat, and desires to be uncovered, and to be constantly fanned. The mode of using frictions requires the careful eye of the medical attendant as much as any part of his plan of treatment: if rudely performed, they will irritate and exhaust; if persevered in without discrimination, the patient will frequently be roused and kept awake, when he might otherwise have fallen into a slumber, an event which is always held to be very favourable in cholera. If frictions fail, and if gentle fanning appears to soothe and tranquilise the patient, it will probably be advantageous to yield to his wishes in this respect, taking care to avoid any unnecessary exposure of the surface.

General remarks.—Such is the outline of the practice

recommended in cholera, drawn from a consideration of the reports made to the medical board. It is a disease extremely difficult to be treated; for, unless at the very commencement of the attack, the symptoms are chiefly what we have denominated *negative.* In most other diseases, especially such as are of an acute and dangerous tendency, the physician sees what he has to cope with. He observes certain *morbid actions*, the removal of which, permitting the restoration of the natural actions by the inherent powers of the living system, forms his plan of cure. This may be said to be the summit of the physician's art. In cholera, however, we too often find the natural actions subdued, or annihilated, not by the intervention of *morbid* actions, but by a power directly affecting the *vitality* of the body. Hence, in all those cases where we can trace only a depression of the vital and natural functions—in other words, where the symptoms are *negative*—our practice is singularly unsuccessful; but, on the contrary, in those cases where, instead of mere suppression, there are manifest and active disorders of some of the functions, our practice, directed to the removal of these disorders, is much more satisfactory. Whatever we may have to do must be done quickly. The frightful rapidity of this disease, and the general implication of functions which so fatally distinguish it, will not permit us to treat it in *detail.* Our remedial means must be employed as speedily as possible, so as to bring their united force simultaneously into action.

In conclusion, the writer and compiler of the present report begs permission to observe, in extenuation of some part of the imperfections with which it may be charged, that it has been drawn up under the disadvantages of frequent and long interruptions, arising from the laborious duties of his public office. It was expected that the tables in the Appendix, obviously a work of much labour, would have been completed and printed off in 1821. They were, therefore, limited at first to the year 1820, at which period

it was likewise intended to have closed the narrative. In consequence of the delays, however, which have occurred in the execution of the work generally, the tables have been extended so as to embrace the year 1821, and the narrative also has ultimately been extended to the close of 1822. Some of the original reports by medical officers, received during the years 1822 and 1823, have been introduced; but the observations during that period have been chiefly of a desultory nature, and not adapted for separate publication, even if the limits of the work, already swelled to an unlooked-for size, had admitted of it.

The original plan of the work, therefore, in which it was contemplated that the introductory report, the narrative, the original reports and cases, and the tables, would all be closed at the same period, has been necessarily abandoned; and several important remarks on the features of the disease have been drawn from very recent reports, the continuance of cholera in these territories having afforded but too much scope for observation.

The extent to which cholera has prevailed in the army during the years from 1815 to 1824 inclusive, will be found at the end of the narrative.

After all that has been written regarding this fatal disease—after all the researches into its causes and effects, perhaps we cannot give a more forcible and brief illustration of its character than in the following words of the poet—

. . . . . " Wasteful, forth
Walks the dire power of pestilent disease.
A thousand hideous fiends our course attend,
Sick nature blasting, and to heartless woe,
And feeble desolation, casting down [man.
The towering hopes and all the pride of
. . Nightly plunged amid the sullen waves,
The frequent corse; while on each other fix'd,
In sad presage, the blank assistants seem'd,
Silent, to ask whom fate would next demand.
. . . Man is her destined prey,—
Intemperate man! and o'er his guilty domes
She draws a close incumbent cloud of death
Uninterrupted by the living winds,
Forbid to blow a wholesome breeze; and stain'd
With many a mixture by the sun, suffused
Of angry aspect. . . . . .
. . . . The circling sky,
The wide enlivening air, is full of fate."

NARRATIVE

OF THE

PROGRESS OF THE EPIDEMIC CHOLERA

IN

THE PENINSULA OF INDIA.

DRAWN UP FROM OFFICIAL RECORDS IN THE OFFICE OF THE MEDICAL BOARD.

NARRATIVE

OF THE

PROGRESS OF THE EPIDEMIC CHOLERA IN THE PENINSULA OF INDIA.

The history of the origin and progress of cholera, in the establishments of Bengal and Bombay, has already been given to the public, in the reports of the medical authorities of those Presidencies. During the period between the months of May and September 1817, it appears to have for some time prevailed in the districts of Momensing, Behar, Nuddea, Jessore, Calcutta, Rajshahy, and shortly afterwards to have reached Balasore and Cuttack. In November, it prevailed at Mirzapore, Rewa, Sheergur, and other northern parts of Bundelcund. Jubbulpore, Saugor, Ougein, and Nagpoor, were under its influence before the end of May 1818. It reached Jalnah, Aurungabad, and and Ahmednuggur early in July. During that month it extended to Seroor and Poonah, and to the Presidency of Bombay about the middle of August. In the following historical sketch, the dates and local progress of the disease, in the territories of Madras, have been determined, with due attention to the authority of the reports consulted; and, for the convenience of geographical reference, it has been successively traced along the eastern, middle, and western districts—from the northern to the southern extremity of what is called the peninsula.

As the narrative of the progress of cholera through these

territories, notices occurrences of the disease under very various states of weather, it may be proper here to offer some explanation of the usual course of the seasons of this peninsula. The winds may be said to be periodical, and are known by the term monsoons. The N.E. monsoon commences generally in October, and is attended with dry weather over all the peninsula, excepting that narrow stripe of coast forming its eastern side, which is washed by the Bay of Bengal, and commonly known as the "Coromandel coast." On this stripe, then, the N.E. monsoon brings the periodical rains, which, commencing sooner or later in October, terminate sooner or later in December; from this last period, till toward the end of February, the N.E. wind, or monsoon, now a dry wind, continues to prevail; and the weather remains cool, and in many places cold The N.E wind then ceases; and from this period till towards the end of May, the winds are irregular, and the heats are intense all over India. In the Bay of Bengal, and on either of its shores, the winds at this time are chiefly from the south, and are remarkable for their humidity, heat, and relaxing effects. About the middle or end of May, the S.W. monsoon commences, and is attended with the periodical rains in all parts of the peninsula, and generally over the continent of India, excepting the Coromandel coast, which then suffers great heat and drought: these rains cease in August or September, when the climate becomes generally sultry and variable, until the N.E. monsoon sets in again.

Thus there are two great and most important distinctions of climate. The Coromandel coast has its *rainy* along with its *cool* season; and its *hot* season may be said to be always *dry*. All the rest of India has the *rainy* season along with the *heats* of June, July, August, and September, when the sun is to the northward of the equator. These rains, indeed, in some degree temper the excessive heat; but their intervals are often distinguished by an intense force of the solar rays, and by dead calms—and that whole period is

subject to all the effects of heat and moisture combined acting on the soil and vegetation.

Referring, then, to the occurrences in the narrative, the Nagpore and Hydrabad States are subjected to the rains from the S.W. monsoon. The northern division experiences the rains of the N.E. monsoon; but this tract feels also the occasional influence of the S.W. rains. The ceded districts, of which Bellary is the capital, have the S.W. rains, and in some degree also the N.E. The Mysore division, which includes the provinces of Malabar and Canara, gets the S.W. rains; the centre and presidency divisions have the N.E. rains; the southern division the same; but it is also within the range, in some parts, of the S.W. rains. The Travancore Force gets the S.W. rains.

The preceding observations, however, can only be received as conveying a very general view of the climate of the peninsula of India. The N.E. monsoon not unfrequently carries its rains far to the westward of the limits assigned; and in like manner the S.W. monsoon refreshes the eastern parts with occasional heavy showers. In some of the more elevated tracts, though the sun be vertical, the air is cold during the rains, especially where the wind blows fresh; but in lower situations, and where the soil is inundated, the air is often extremely hot and oppressive, and is surcharged with moisture.

The following cursory remarks on the elevation, by barometrical observation, of the different provinces of the peninsula, have been drawn from notes obligingly furnished by Captain (now Major-General) Cullen, of the Madras Artillery, whose researches in that and other departments of science are well known and highly appreciated. Without taking into account those habitable but confined tracts, which are found in the Nhilgherry Hills, at an elevation of 5000 to 7000 feet, and those on the Shervaroy, or Salem Hills, at an elevation of 4000 to 5000 feet above the level of the sea, the tableland of Mysore presents the most ele-

vated surface of the Peninsula. The highest part of this table-land includes the stations of Bangalore, Nundidroog, Colar, and Oossoor, forming an area of about 60 miles by 50, and it presents a mean altitude of about 3000 feet above the level of the sea. There is a rapid fall thence on every side; and the mean height of this slope, or belt, surrounding the higher area or plateau above-mentioned, may be stated at about 2400 feet. The valley of Seringapatam, including the town of Mysore, is also about the same height.

Trichinopoly, the capital of the southern division, is only about 250 feet above the sea; but the ground rises to the southward of this place, attaining at one point the height of 800 feet; so that, if a line be drawn through the division, by Madura and Palamcottah to Cape Comorin, it would give a mean altitude of between 400 and 500 feet. The country, in this quarter, has a gradual rise from the eastern shore to the westward, where it is bounded by the great Travancore chain of mountains.

There is, indeed, a very remarkable ascent, observable throughout the whole of the Peninsula south of Berar, from the eastern shore to the great Western Ghauts; and one need only cast his eye on the map to perceive this, by the course of the rivers, which uniformly take an easterly direction, and fall into the Bay of Bengal. The country from Madras, by Arcot, towards the bottom of the Pedanaigdroog Pass, rises gradually to the height of between 800 and 900 feet above the sea; and a similar slope may be considered to obtain for 60 or 70 miles southward of Madras, and for 130 or 140 miles north of it. The western coast is, however, comparatively broken and precipitous, rising in abrupt undulations and low hills, which are covered with jungles or forests, from the sea to the great chain of Western Ghauts. The mean height of the provinces of Malabar and Canara may be estimated at about 200 feet above the level of the sea.

The ceded districts, which adjoin the Mysore territories on the north, partake of the general slope which has been noticed. Bellary, the capital, lying nearly in the centre of the province, is about 1600 feet above the level of the sea; and the rise continues westward till it attains the elevation of about 2500 feet. Belgaum, in the Dooab, is situated at this height, which is nearly the highest part of that province.

The average altitude of the province of Hyderabad, including an area of nearly the same magnitude as the Mysore table-land, is about 1900 feet above the level of the sea: the city of Hyderabad itself lies low, and is situated near the northern edge of this area. The slope to the east and north-west from this elevated portion is rapid, that to the north is much more gradual; the space to the south, between it and the ceded districts, comprehending the bed of the great river Kistna, is from 1100 to 1300 feet above the level of the sea.

The elevations of Bangalore and Hyderabad thus interrupt the general slope of the peninsula which has been already noticed. The country round Jaulna is from 1600 to 1800 feet above the level of the sea; and the general ascent from east to west is here very distinctly marked. Poonah, situated near the Western Ghauts, is believed to be 2500 feet, or nearly so, above the sea.

The flat open plains of Nagpore seem to indicate their approach to the alluvial districts of the Ganges; for, at the very base of the peninsula, and at a distance of 400 miles from either the eastern or western sea, they attain only an elevation of 800 or 900 feet. Hinginghaut, situated 50 miles south of Nagpore, is only 700 feet above the level of the sea.

The northern division, including Guntoor, is a series of level plains elevated nowhere more than 50 feet above the sea. The Ghauts approach the coast near Vizagapatam, without causing any material alteration in the level of the intermediate valleys.

The stations along the eastern and western coasts are so immediately on the level of the sea as to require no observation. The elevation of the principal inland stations may be given as follows:—

	Feet.		Feet.
Wallajahbad,	300	Cuddapah,	480
Arcot,	558	Gooty,	1260
Vellore,	676	Bellary,	1600
Nellore,	80	Adonie,	1400
		Kurnool,	900
Salem,	907	Belgaum,	2500
Trichinopoly,	250	Badamie,	2100
Dindigul,	700	Darwar,	2423
Madura,	600		
Palamcottah,	209	Secunderabad,	1850
		Jalnah,	1650
Bangalore,	3000	Poonah,	2500
Seringapatam,	2300	Nagpore,	932
Mysore,	2500	Chandah,	600

The general appearance of the countries above and below the Ghauts is considerably different. The former are distinguished by a dry soil, intersected by streams of running water, having but few tanks—the general cultivation being that of dry grain; the latter are more open and flat, sandy, watered chiefly by tanks, and affording the great field for rice cultivation. The jungles below the Ghauts can only be considered as extensive tracts of brushwood ; those above, and in the Ghauts, are composed of forest trees and bamboo.

It has been found that the forest-jungles of the western coast are extremely dangerous to approach during the dry season; and that they cannot be entered with tolerable safety until the rains have fallen plentifully. It is said to be comparatively safe to traverse them during the wet season, and during the period when vegetation is going on with vigour. On the other hand, it is reckoned extremely unsafe to enter the forest-jungles of the northern Circars during the rainy season, or immediately after it; and the

only period at which they can be traversed with comparative safety, is the *hottest season.* This leads us to recur to the observation formerly made, that the rains on the western coast fall during the hot months of June, July, August; and those on the eastern coast, during the cold months of October, November, and December. Now, though the grass, and almost all the small plants, are withered and dried up, during the hot season, on this coast, it is on the commencement of this season, nevertheless, that the trees and larger shrubs put forth their new leaves; and they cast the old leaves during the cool and dry weather, after the rains. If, therefore, the periods of foliation and defoliation of trees *be the same on both coasts*, as appears to be the case, the relative salubrity or insalubrity of the jungles may depend on these processes, and the consequent decomposition of vegetable matter, as much, or more, than upon the circumstances merely of rain or drought—the former being the healthy, and the latter the unhealthy periods, in both instances.

In a considerable portion of the southern territories, rice culture takes place from the inundation of the Cauvery River, which is swollen by the western rains, thus placing the surface of the soil under water, while perhaps the appearances of the atmosphere are such as belong exclusively to the dry season. Accordingly, these countries are frequently the seat of epidemic sickness; and they have suffered considerably, and with less interruption, from attacks of cholera.

In the Madras territories, cholera first appeared in the district of Ganjam. The magistrates of that place, in a letter dated 20th of March 1818, state that the inhabitants had suffered severely from fever and cholera. It does not appear, however, that the cholera was at all very prevalent in most parts of that district. It was frequent at Aska, from the 23d of April until the 16th of May. At the latter period it suddenly disappeared; but it again

manifested itself in the beginning of July, and during the month prevailed more generally than it had formerly done. After November, few cases were observed in the Ganjam district, although the disease was then, and for a year afterwards, general in the contiguous district of Vizagapatam. Fever prevailed in several parts of the former district until March 1819. At Berhampore, cholera was rather frequent in September and October 1820.

No authentic information regarding the course of the disease at Chicacole has been obtained; but it is known that this place was not exempted from its destructive influence.

No well-marked case occurred at Vizianagram until the 20th of May; and then the cases which did occur continued to be slight until the 26th. From this time, until the 5th of July, the disease continued to prevail generally. For a month after its commencement, though formidable in appearance, being attended by violent spasms of the whole body, it almost always yielded to the timely application of the appropriate remedies; but during the remaining fortnight, although at first much less alarming, and without evident spasms, it frequently resisted every mode of treatment, applied even in the early stage. After the 5th of July, only a few slight cases occurred.

At Vizagapatam it appeared about the 15th of May. The weather is said to have been then oppressively hot, and the air loaded with humidity. It would seem that few Europeans were attacked after June; but the disease, differing occasionally in its prevalence, and in the severity of the symptoms, continued to be general in Vizagapatam, and the neighbouring country, until February 1820. It had somewhat declined in December 1818, but became again very prevalent in March. In May 1819, a greater number of cases were exhibited than in any other month; but the greatest proportional mortality occurred in April and November of that year.

It showed itself at Rajamundry about the 10th of July, began to decline about the beginning of August, and disappeared early in November. It reappeared at this place on the 25th of January 1819, while an uncommonly cold wind was blowing from the south-east; and it continued to prevail until the end of April.

It commenced its attack at Ellore about the 5th of July, both on the 1st regiment of native cavalry, stationed there, and the native inhabitants. It was remarked that the Mussulman families were the greatest sufferers, although the population consisted principally of Hindoos. The greater mortality among the former was ascribed to their obstinacy in refusing proper medical assistance.

At Masulipatam, cases first occurred about the 10th of July. The convicts confined in the fort were the subjects of these cases; and, indeed, the disease, for some time, appeared only in one bomb-proof apartment. This one was low, damp, ill ventilated, and very crowded; but although these disadvantages were in some measure remedied, it continued to produce a greater number of cases than the other two, which were commodious and comfortable. The disease commenced in the town and neighbourhood about the 20th of July; was very prevalent during August; declined rapidly in September, and disappeared early in October, while the weather was chilly and the rains heaviest. It was nearly confined to the lower classes of the people. It reappeared at this place about the 15th of June 1819, during extremely hot weather. This attack, however, was not so violent, nor of so long continuance as the former.

In the several villages situated along the southern bank of the Kistnah river, from the eastern extremity of the Zillah of Guntoor, to the western extremity of the district of Palnaud, it seems that it appeared nearly simultaneously, about the end of July; that it gradually extended southwards; and that, about the middle of November 1818, it quitted that part of the country. It commenced about the

beginning of the westerly rains, and continued until the termination of the rainy season. It is reported to have been more fatal during the prevalence of bleak westerly winds than at other times; and in the villages situated in the vicinity of tanks than at other places. The *Banians*, or merchants, of the town Guntoor, who occupy the only wide and dry street in it, almost entirely escaped the disease; while the *Brahmins*, or priests, who inhabit a close and damp street, suffered in as great a proportion as any other class of the people.

In the most northerly villages of the Zillah of Nellore this disease began to prevail on the 2d of August; and before the 5th of October it had reached the most southern part of it, having in its course appeared at the town Ongole on the 14th of August, and at the town Nellore on the 20th of September. The Zillah extends about 180 miles from north to south, and varies between 40 and 60 miles from east to west. In twelve days it travelled 32 miles; in the next twenty-seven 80 more; and, in two months from its commencement, it spread over the whole Zillah, except the two south-west divisions of it, which altogether escaped this visitation. These are the most elevated parts of the Zillah; they are populous, and much frequented by merchants. The disease, indeed, was less fatal than in the other parts in the whole western frontier, which is near the hills; and, in some of the villages there situated, it did not at this time appear. There had been no sensible change in the atmosphere previously to its approach; nor was its progress at all affected by the occurrence of the rains. It continued during the rainy season; and, disappearing in the order in which it had commenced, it entirely quitted the Zillah before the 15th of January 1819. It again became general in the northern parts of the Zillah about the middle of April 1819, and continued to travel in a southerly direction at nearly the same rate as formerly, having reached Ongole on the 16th

of May, and Nellore on the 3d of July. In the Ongole district it disappeared before the end of August, and in that of Nellore about the end of September. The period of its continuance in any large town or tract of country, in this district, scarcely ever exceeded three months. At this time it was more prevalent, and much more fatal, than last year; and it was especially violent at those places which then enjoyed an immunity. The weather was mild and temperate during the whole period of this second attack: there were occasional falls of rain, but no change in the sensible properties of the atmosphere seemed to affect the cause of the disease.

At Madras, the first case seen by a medical officer occurred on the 8th of October; but, from the accounts of natives, it then appeared that some cases had occurred so early as the 5th of that month. It continued to prevail generally in Madras and the adjacent villages until the 24th, when it received a temporary check from a violent storm that happened on that day. It very soon, however, increased again, and prevailed with a considerable, though variable, degree of violence until the beginning of November. It then began to decline slowly; and some time afterwards it became milder and of rare occurrence. The poorer classes suffered more from its ravages than those in better circumstances. On the 5th the wind was south-easterly, the weather cloudy and wet, and there was much thunder. On the 7th the wind became north-westerly, and it continued in this direction until the 12th; from the 12th to the 15th it was variable. The weather was cloudy, and much rain fell from the 5th to the 15th. From the 15th to the 23d the wind was, with little variation, south-easterly, and the weather generally pretty clear. The north-easterly wind commenced on the 23d, and the violent storm already noticed occurred on the 24th. The weather, though variable, was pretty frequently clear after this period. In April 1819 the troops at the presidency

were entirely free of the disease; but it reappeared early in May; and, although it did not afterwards become general, it has continued to show itself occasionally since that period. Its attacks were most frequent during the hot months of 1819 and 1820; in 1821 they have been of more rare occurrence.

It appeared at Poonamallee on the 13th of October, and, without having become very prevalent, seems to have disappeared about the middle of the following month. From the 8th to the 21st of July 1819, many cases again occurred at this place.

At St Thomas's Mount, also, it appeared on the 13th of October; but, although not very violent or general, it continued long at this station. It declined considerably in December, and continued to decrease until May 1819. It again increased in May; and, during the three subsequent months, was more prevalent than at any preceding period of its course. It declined in September, and early in 1820 became of rare occurrence.

It first showed itself at Wallajahbad about the middle of October, and continued to prevail with different degrees of violence in H.M. 86th regiment, and among the native inhabitants, during November and December. Several cases occurred there about the end of April, and a few in the beginning of May 1819; it became prevalent towards the end of June of that year, especially in H.M. Royal Scots; declined about the 8th of July, and soon afterwards disappeared.

The cholera continued its progressive course along the coast; but we have no accurate accounts of the dates of its appearance or decline at Sadras or Pondicherry. It first manifested itself at Cuddalore about the 14th of November, after the commencement of the heavy rains, and continued to prevail with considerable violence till the end of December. At this time it declined rapidly, and soon afterwards ceased.

At Combaconum it appeared about the 20th of November, declined about the middle of December, and soon afterwards terminated. About the middle of January it was, for two or three days, nearly as prevalent as it had formerly been.

It began to prevail at Nagore about the 10th of November, principally among the caste of natives whose occupations obliged them to expose themselves much to the weather, which was then damp and rainy. Negapatam, although distant from Nagore only four miles, continued entirely free of the disease until the 22d of November. It was much on the decline at both places before the 20th of December. As at Combaconum, it was again very prevalent at these places for two or three days, about the middle of January, It reappeared at both towns about the end of July 1819, and continued prevalent until the middle of August. At Nagore it again showed itself about the end of October, and prevailed until the middle of the following month, and at Negapatam several cases occurred from the 1st to the 13th of February 1820.

Having thus traced the progress of this disease along the eastern coast, as far as it might be supposed to be connected with its first appearance at Ganjam, it will now be necessary to give some account of its course along the inland stations occupied by troops of this presidency. Here also we shall begin with the most northerly of these, which was likewise the first that became subjected to its influence.

It began to prevail among the inhabitants of Nagpoor, and the neighbouring villages, about the middle of May 1818; but, although generally diffused, and productive of great mortality among the citizens, with whom our native soldiery had frequent and intimate intercourse, no case of it appeared in the troops until the 26th or 27th of May. At this time three or four men of the depot corps were attacked, and died. On the 30th of May, a large detachment

of Bengal and Madras troops arrived at Nagpoor from the siege of Chandah, and took possession of the huts near the Sittabuldee hills, which they had formerly occupied. Notwithstanding the excessive heat of the weather, and the laborious duties of the siege, they had hitherto been tolerably healthy, and no one had suffered an attack of the cholera. Scarcely, however, had they taken possession of their quarters, when it appeared in a very violent form among the Bengal troops and their followers.

Of the Madras troops only one individual was this day affected. On the 31st, however, it attacked them and their followers in a very violent manner, the majority of those this day affected having died. On the 1st of June the attacks were very numerous, but the deaths were proportionally much fewer. From the 2d it began to decline rapidly; and after the 10th rarely occurred. For some days it was confined to the troops who had returned from the campaign; and, when it did appear in those who had not left Nagpoor, it was comparatively very mild and partial. The European part of the force suffered but little. A few of the Madras artillerymen were attacked, but they all recovered. Three or four men of the Bengal artillery fell victims to it. In a detachment of the force recently employed at Chandah, which was left at Hingumghat, 50 miles south of Nagpoor, it appeared at the same time, and followed the same course as it did in the main body of the force at the latter place.

At Jalnah, cases were first observed on the 3d of July among the families of our native soldiery in the village. On the following day it attacked the troops, both European and native; and from this time until the 11th, it continued very prevalent and violent. After the latter period, the attacks were milder and less frequent; and before the latter end of July the disease had almost disappeared at the station. Several facts, connected with the origin and progress of the disease at this place, having been adduced

in proof of its contagious nature, it may be deemed necessary here to notice them. Since the middle of June, when several heavy showers of rain had fallen, the weather had been cool and pleasant, the thermometer ranging from 80° to 86°, seldom varying more than 4° in twenty-four hours. The atmosphere was generally cloudy, and the wind blew steadily from the south-west. This kind of weather continued during the prevalence of the disease. A detachment, which had left Nagpoor while the disease was prevailing at that place, and of which some men suffered an attack of it in the march, arrived at Jalnah towards the end of June. On the 3d of July, the cholera, as has been seen, appeared at the latter place. The Russel Brigade arrived at Jalnah on the 4th, and left it for Hydrabad on the 5th of July, without any case of the disease having appeared among them; but a few days afterwards it attacked them, and produced great mortality. A party of gentlemen, with about 1000 followers, arrived at Jalnah on the 4th, and left it in good health on the 6th: before they arrived at Aurungabad, however, many of their followers were attacked by the cholera, and it began to prevail at that place soon after their arrival. The disease was most prevalent in the vicinity of the place where the first case occurred. H. M. Royal Scots, who were stationed immediately in the front of the general market-place, in which the disease raged, and with which they had constant communication, suffered much by it; while the horse-artillerymen, who were a considerable way in front, and had less direct communication with the market-place, and but little intercourse with the Royals, suffered comparatively very little: this fact, however, has been ascribed to another cause,—the artillerymen lived in tents, and the Royals in old and uncomfortable barracks. The latter were removed into their tents; and the cases, the day on which this removal was effected, were only one-third of the number that had occurred on the preceding day. The disease con-

tinued to decline after this period. When it appeared in a family, several individuals of that family generally suffered an attack. An endeavour will be made in the proper place to appreciate these arguments.

It appeared on the 14th of July in Lieutenant-Colonel Heath's detachment, encamped in the neighbourhood of Nasseerabad, south of the Taptee river, and among the inhabitants of the surrounding country.

In Lieutenant-Colonel MacDowall's camp near Malligaum, in Candeish, it appeared among the camp-followers on the 13th of July. It attacked some men of the Madras European Regiment on the 16th, and from this day until the 23d, the cases in that corps were numerous and very violent. After the latter period, the severity and frequency of the attacks were diminished: several violent cases, however, occurred during August. A considerable number of people who had left Jalnah during the prevalence of the disease, and some of whom were attacked on the way, arrived in the camp before any case had occurred in it. The 17th Regiment of Native Infantry, which composed part of this force, and its followers, entirely escaped the disease. Over the ground of its encampment, which was situated between two hills, a strong current of air is said to have then constantly blown. The European regiment was encamped on lower and more confined ground, and, when the cholera declined, a malignant bilious remittent fever became very prevalent in the corps.

Nasseerabad is about 80 miles N.N.W. from Jalnah, measuring in a straight line on the map; and Malligaum is about 100 miles from it, in a W.N.W. direction. We have seen that the epidemic appeared at both these places in ten or eleven days from the date of its first appearance at Jalnah. These detachments had direct communication with the force at Jalnah, and they present almost the only exceptions to the uniform progress of cholera in a southerly course on this side of India. In Sir John Mal-

colm's camp at Mhow, cholera is incidentally noticed as having attacked part of the force on the 16th July; but it would seem, from the Bengal report, to have first appeared there in the course of the month of May, its progress being from east to west. Mhow is situated near Indore, north of the Nerbudda, and is about 120 miles N. by W. from Nasseerabad: the force was composed of the troops of different presidencies; it was independent of that at Jalnah; and there is no particular report in this office of the manner in which cholera made its appearance there. We may conclude, however, that the attack on the 16th July was unconnected with the appearance of the disease at places to the southward of the river Taptee.

It began to prevail in Punderpoor on the 14th of July, while crowded by strangers congregated for the celebration of a great festival. Here, as at other places in similar circumstances, the mortality it produced was very great. It commenced its attack on the troops in the vicinity on the 17th, and declined about the 24th of the month.

In the force encamped near Hoobly, in the Dooab, the first case of this epidemic occurred on the 13th of August 1818: for some days afterwards it was very partial, and confined to the camp-followers. It seems to have appeared at Badamee and Darwar nearly at the same time as at the head-quarters of the force. It continued to exist in the force till about the end of September, but was most prevalent from the 18th of August till the 1st of September. When it appeared, a strong wind prevailed from the south-west, with heavy clouds and rain. Neither Hoobly nor any of its adjacent villages had at this time become affected, nor had any person arrived in camp from the country north of the river Kistnah, in which cholera was then prevailing. This force again experienced a pretty severe attack of it about the middle of April 1819, when encamped in the neighbourhood of Guddick. At the com-

mencement of this attack a strong easterly wind prevailed; but in a few days the wind changed to the west. After this period the disease declined, the cases being fewer and milder than during the preceding days.

At Bellary, it manifested itself on the 8th of September 1818, but until the 17th was partial, and confined to the native inhabitants. From this time until the end of the month its attacks were pretty frequent in the troops, both European and native. It declined about the beginning of October, and disappeared from the European troops on the 5th of that month. About the 20th of October it again attacked, with its former violence, the troops and inhabitants, especially the lower fort, where it was more prevalent than in any place without in the immediate neighbourhood; and it did not disappear till towards the end of November. The greater prevalence in the lower fort has been ascribed to its confined and crowded state, the barracks of the soldiery being surrounded by the huts and houses of the natives. Of five hundred prisoners in the public jail of Bellary, only one was attacked, and he recovered: the jail is situated about twelve hundred yards eastward of the fort, and is surrounded with a high stone wall. H. M. 34h regiment commenced its march from Bellary to Bangalore on the 17th of September, no well-marked case of cholera having then occurred in the regiment: one man was attacked on the following day; but no case occurred on the 19th and 20th. Twenty-eight men of the corps were attacked on the 21st, twenty-four on the 22d, twelve on the 23d: from the 23d the disease continued to decline rapidly; and after the 29th no case occurred. Of about 700 men, 91 were attacked, and of this number 37 died. The disease did not exist in any of the villages on the route when the corps passed, but it soon afterwards appeared in all of them. Bellary suffered another attack of the disease about the beginning of May 1819.

It appeared at Hurryhur on the 12th of September, and

continued to prevail in it and the neighbouring villages till about the end of the month.

At Chittledroog the first case was observed about the middle of September, but until the end of October only a very few slight cases had occurred. From the 1st to the 15th of November the attacks were pretty numerous, and frequently of fatal termination. During the remainder of November a case occasionally presented itself.

At Bangalore a few cases of the disease presented themselves towards the end of October, and during November; but it did not at any time prevail generally at this station. H.M. 69th regiment commenced its march from Bangalore to Cananore on the 12th of October, no case of cholera having then occurred at the former place. On the 20th, while encamped in the vicinity of the Madoor river, two men of a detachment of native soldiers, accompanying the regiment, were attacked by cholera; no European, however, experienced an attack until the 24th. This disease was pretty frequent in the corps from the 28th until the 13th of November. The weather had been generally rainy since the commencement of the march; and when cholera appeared, the vicissitudes of the weather were sudden, and the camp was nightly deluged with rain. The corps arrived at Cananore on the 18th of November. From the 12th, when the march was commenced, until the 28th of October, dysentery was the most prevalent disease; but from the latter date until the 13th November, cholera maintained the ascendancy. After that period, till the 24th of November, dysentery was again predominant; but from the 24th until the 3d of December, intermittent fever, which had previously been rare, was the prevailing disease. No case of cholera had occurred during the last interval. The intermittent was of the quotidian type: only two cases of remittent occurred. After the 3d of December dysentery regained the ascendancy. Hepatitis also became more frequent. A statement of the number attacked by the pre-

vailing diseases, during the intervals just specified, will be found at the bottom of the page.*

At Seringapatam it appeared about the 6th of November 1818, and continued to prevail very generally about a month. It followed nearly the same course at the town of Mysore, and in the intervening and adjacent country. No authentic statement of the number of inhabitants who suffered from this disease has been received; but if common reports are entitled to any credit, the mortality must have been much greater here than in any other part of the country. The people, it is said, convinced that the disease was a visitation of the displeasure of one of their gods, were more anxious to propitiate the offended deity than to apply for medical aid, which was freely offered to them. They flocked to the temples of their gods, and deluged the altars with the blood of numberless goats, rams, and buffaloes; and having offered the head of the victim, they generally retired to regale themselves with the consecrated carcass. It is said that, in many instances, having overcharged their stomachs with this food, they the same night experienced a fatal attack of the disease. The performance of their superstitious rites subjected them to unusual fatigue, and exposed them to the vicissitudes of the climate, at the season when these were most frequent and most violent. These causes, to which the extraordinary mortality has been ascribed, must have had considerable influence; but it would be interesting to investigate, whether the climate of

	Dysentery.	Cholera.	Intermittent Fever.
* From the 11th to the 28th of October	22	5	2
——— 27th October to the 13th November	17	50	2
——— 12th to the 24th of November	27	10	8
——— 23d November to the 3d of December	8	0	33
——— 2d to the end of December	33	1	18

In October 6, in November 12, in December 18, were attacked with acute hepatatis.

Ten cases of cholera terminated fatally; three in October, and seven in November. In October, dysentery was not in any instance fatal, but in November three, and in December four men fell victims to that disease. All the cases of fever and hepatitis yielded to the remedies employed. Strength of the corps about 650 men.

these places, which is notorious for fevers, might not have had some share in aggravating the calamity.

At Manantoddy in Wynaad, about thirty cases occurred from the 16th to the 22d of October 1818. The weather during these days was cloudy, and a strong, cold easterly wind prevailed.

It commenced its course in the district of Coimbatoor, towards the end of November 1818, and soon became very prevalent and destructive in the villages situated in the vicinity of the Cavery river, particularly in Errode and Carroor. It reached Coimbatoor on the 30th of November. It declined in December, and had almost disappeared by the end of January 1819. Cases seem to have occasionally occurred until October following, when the disease again became very prevalent. It declined in November, and disappeared in February 1820. The endemic fever existed during the prevalence of cholera; and as the latter disappeared, the former became pretty general throughout the district. The fever, however, seems not to have been severe, a small proportion of those attacked having died. It will now be necessary to revert to the northern parts of the centre of the peninsula.

Cholera attacked the Mysore horse on the 8th of July, while on the bank of the Godavery river, on the route to Hydrabad, and it continued to prevail in the corps until towards the end of that month.

At Hydrabad it appeared towards the end of July, but it was not so prevalent nor so violent here as at the greater number of other stations. The cantonment enjoyed an immunity for many days after the disease had become prevalent at the residency, distant about five miles, and those first attacked were soldiers who had returned from duty at the residency. It prevailed also several days in the market-place, called *Begum Bazar*, before it reached the city of Hydrabad, although these places are separated only by a small river. Many cases occurred in the cantonment

at different periods subsequently to this attack, but the disease did not afterwards become general. The circumstances of one of these subsequent manifestations seem sufficiently interesting to require a more minute statement. A detachment of Europeans, in which cholera was prevalent, arrived at this place early in May 1819, and was encamped about two hundred yards in front of the quarters occupied by the artillery. The disease did not at this time exist in the cantonments, but three or four days afterwards it appeared in the party of artillery, five or six men of which soon suffered a severe, though not in any instance a fatal attack. The wife of a conductor of artillery next became a subject of the disease; and a female friend, who attended her for two hours, was also attacked, and died next morning. The son of this woman, aged six years, suffered an attack the day after the death of his mother: he recovered. One assistant and two sub-assistant surgeons, who had spent much time with the sick, were attacked, and one of the latter died. The disease soon appeared in the market-places, in which it proved fatal to several natives. Few cases occurred in the native corps stationed at this place, and H. M. 30th regiment, which was in barracks about half a mile to the right, entirely escaped the disease. The detachment which had marched from Madras was attacked with cholera at the river Kistnah, after exposure to a severe storm of wind and rain, and it continued to infest them on the route to Secundrabad. The villages on the road were at this time free of the disease; but a medical officer, who travelled by the same road from the Kistnah to the Secundrabad, about two weeks afterwards, found it prevailing in every village. The inhabitants asserted that it had commenced after the passage of the detachment, which they believed had communicated it to them.

It first appeared at Gooty on the 6th of October 1818, and cases occurred occasionally until the beginning of Feb-

ruary 1819. It does not seem, however, to have been then prevalent at that place. The 2d battalion 16th regiment Native Infantry, stationed at Gooty, as well as the inhabitants of the place, experienced a very fatal attack of cholera in February 1820. It appeared on the 2d of the month, immediately after the departure of the 1st battalion 16th regiment, in which it had proved very destructive during the march from Hydrabad, and in which it prevailed during a halt of three days at this place. It declined on the 20th, and was of rare occurrence after the end of the month; early in March, however, it began to affect the inhabitants of the neighbouring villages. Of 101 cases among the men of the 2d battalion 16th regiment, admitted into hospital during February, 75 terminated fatally. No case had occurred at this place during the six preceding months. It was observed that a great number of the attendants of the sick were attacked; and that generally, when one case occurred in a family, several members of that family became subsequently, and often almost immediately, affected.

At Cuddapah it first manifested itself on the 9th of October; but it does not appear to have become general there.

It appeared at Tripetty on the 1st of October, during a festival; and it soon carried off a considerable number of victims.

At Chittoor it showed itself early in October, and it was said to have prevailed for some time pretty generally in the district.

The first case of cholera, observed at Vellore, occurred on the 3d of October; but very few were affected before the 18th of that month. From the latter period till towards the end of December, its attacks were pretty numerous. It does not, however, appear to have been nearly so prevalent here as at the neighbouring stations of Chittoor and Arcot.

This epidemic appeared at Arcot about the 13th of October, and was generally prevalent until the 23d. At this time it suffered a slight remission; for although it continued during the remainder of that month, and all the following month, the attacks were not so numerous nor so severe as during the preceding period of its course. It appeared on the day on which the wind changed from the south-west to the north-east, or monsoon quarter. The weather after this period was variable; the wind blew in sudden squalls, and torrents of rain fell; the sky was generally overcast; and although the thermometer did not fall lower than 74° at noon, a peculiar chilly sensation was felt. On the 22d, a strong gale of wind, accompanied with rain, blew from the south-west; and on the following day, as has been mentioned, the disease had considerably abated. This disease reappeared at Arcot about the beginning of May 1819, and shortly afterwards at Vellore and Chittoor; but it does not seem to have been very prevalent. It left these places about the beginning of July.

It seems to have entered the Barahmaul and Salem districts from the north-west, about the middle of November, and at an early period of its course to have carried off many of the inhabitants of the villages situated on the banks of the Cavery. It showed itself at Sankerrydroog on the 19th of November, and began to decline about the beginning of December. On the 22d of November it appeared at Salem: the weather for ten days preceding had been cold, cloudy, and rainy, and the wind was piercingly sharp. Here, as at other places, it first prevailed among the poorest and most destitute class of the people. It continued very general until the 14th of December; but after that period it declined rapidly, and before the end of the month cases were of rare occurrence. Of the prisoners in the jail, who were exempted from their usual labour and exposure during the prevalence of the disease, only nineteen were attacked, and of these only two died. The inhabitants of

the large hills in the neighbourhood of Salem prohibited any communication with those of the valley; and it is said that they enjoyed an exemption from the visitation with which the latter were afflicted. Whether this immunity is to be ascribed to their precaution, it is not, in this place, our business to inquire. It reappeared in a moderated degree at Salem and Sankerrydroog towards the end of August 1819, after a long continuance of rainy weather.

The first case of cholera observed at Trichinopoly, occurred about the end of October, in one of a company of native soldiers which had entered that place from the northward. Two men of the company had previously died on the march, in consequence of attacks of cholera; and this man, who also soon died, was attacked before his arrival. On the 1st of November another fatal case occurred in the village of Pootoor. About the 5th, several persons, especially of the washermen's families, were attacked in the neighbouring villages of Warriore and Pootoor, and some of them died before assistance could be procured; a few fatal cases at the same time occurred on the outside of the north-west gate of the fort towards the river. From that period the number of cases daily increased; and the disease gradually extended itself from the north-west to the south-east gate of the fort. On the 9th, it manifested itself in the barracks of the European Pensioners and Native Veteran Battalion, situated in the immediate vicinity of the river-gate of the fort; about the 13th, in the artillery barracks, situated on high ground on the southward of the fort; and on the night of the 16th in the barracks of H.M. 53d regiment, situated on elevated ground on the southwest side of the cantonment. It continued to increase in prevalence until the 20th; but after the 22d it began sensibly to diminish, and soon afterwards declined rapidly. About the middle of January 1819, it recurred in a moderated degree; but after two or three days it began speedily to disappear. Many cases were reported to have happened

among the native inhabitants of the town and neighbouring country in July 1819, and in some parts of the district during August and September. The disease showed itself again at this place about the middle of November, and it prevailed to a considerable extent in the early part of December 1819.

It reached Tanjore and its neighbourhood about the 20th of November; soon became very frequent, continued to increase irregularly during December, and attained its acme about the middle of January 1819. It began soon afterwards to decline, but its decrease seems to have been slow and irregular. It did not disappear until April 1820.

Continuing its progress to the south, it appeared at Madura about the end of November, and soon became diffused over the adjacent districts of Dindigul and Ramnad. Its course in these districts has been irregular, and protracted so long, that in some places it did not cease to be general until March or April 1821. At several places it had declined and almost disappeared, but returned without any evident cause: it was very general and destructive over the whole of the Madura district, in the month of June 1819. In the districts of Madura and Dindigul, the endemic fever prevailed to a great extent at the same time with the cholera.

At Palamcottah it began to prevail in the beginning of January 1819; and it had declined considerably before the end of that month. It disappeared from the inhabitants and troops previously stationed there early in February: but the 1st battalion 15th regiment, which had returned from Ceylon, continued to suffer from it till near the end of that month. It was some time afterwards reported by natives that the disease prevailed in different parts of the surrounding country, but no cases were again observed at Palamcottah until the beginning of September. Many cases occurred here in September and December 1819, and in January and the latter part of April 1820. It prevailed

also to a considerable extent in the town of Tinnevelly, in April 1820.

Having now given some account of the course of this epidemic along the eastern and interior territories of this presidency, it only remains to advert to its progress along the Malabar coast.

It seems to have prevailed at Hullyhall and Soonda early in September 1818, and to have continued there for several weeks. These places are situated to the west and south of Darwar, where, it has been seen, the disease was prevalent during the latter part of August.

Some cases occurred at Mangalore, especially among the prisoners, from the beginning to the 20th of September; but the disease did not then become general. It recurred with considerable severity on the 8th of November, and did not disappear till towards the end of January 1819.

It reappeared in March 1820 in the frontier towns of Soonda, having spread, according to report, from the adjacent Maratta States. In June it had extended southwards to Mangalore. The symptoms were extremely violent, and caused death in many instances in two hours. The mortality was very great; and the inhabitants fled in terror from their villages to the jungles.

Cases were first seen at Cannanore on the 5th of December. The subjects of these cases lived in a place near the beach, and on the side of the town next to Tellicherry, where the disease had for some time prevailed. The disease immediately became pretty prevalent in the town, and soon afterwards in the neighbouring villages. In the former it began to decline about the 14th, and in the latter a few days afterwards. It seems to have disappeared before the end of the month; at most, only a few partial cases afterwards occurred. A much greater quantity of rain than usual is said to have fallen at this place in the preceding monsoon; and during October, and the greater part of November, the weather is said to have been calm

and sultry. Towards the end of the latter month, the land-wind began to blow with some force; the atmosphere was cloudy for a few days; some rain had fallen, and the night air towards the morning was so chill, that the natives complained of the cold. No case had occurred in the fort during the prevalence of the disease; but about the 10th of February 1819, several of the prisoners in the jail were unexpectedly attacked. In the course of the seven follow-days, twenty-nine of these people were attacked. The disease then disappeared, without having extended beyond the jail.

About the middle of November a great alarm was created among the inhabitants of Tellicherry by the exaggerated accounts of the mortality produced by the cholera at Mangalore, and in H. M. 60th regiment, then approaching Cannanore. Very few cases, however, occurred until the 25th of November. During December it prevailed to a considerable extent among the poorer classes of the people, especially the beggars, and fishermen of the lowest order; and of these the aged, and infirm, and dissolute were the greatest sufferers. No soldier, policeman, or prisoner was attacked. The disease disappeared early in January. The weather in November had been variable, rain having occasionally fallen, and a strong southerly wind having sometimes prevailed. The thermometer was from 74° to 82°. About the middle of December the weather became dry and agreeable; the wind blew from the land; but this favourable change did not seem immediately to influence the prevalence of the disease.

This disease, it was reported, became prevalent in different districts of the province of Calicut in October. At Calicut two cases had occurred in May; but it would seem that no more cases were observed there till about the middle of October. Towards the end of December its symptoms, which had hitherto been moderate, became much aggravated, and its attacks more frequent. The

prisoners and police corps now began to suffer. It declined considerably in February 1819; but it continued to exist, generally in a less severe and less prevalent degree, in some districts of the province, until October following. In July and August it was more prevalent and violent than during the interval which had elapsed since the commencement of its decline. The poorest of the people, who suffered great privations, were chiefly its victims.

It appeared in the neighbourhood of Cochin about the 8th of December, and immediately became pretty general. It declined towards the end of the month, and disappeared early in January 1819. Some partial cases occurred among the soldiery in March, April, May, and July 1819.

It seems that several slight cases occurred at Allepey early in October, and that the disease became pretty prevalent there about the beginning of November. Several cases appeared also in July following.

At Quilon it began to show itself about the end of October, and continued to advance slowly until the middle of November. It then declined; and, without having prevailed to any considerable extent, soon afterwards disappeared. Only four Europeans were attacked, although a European regiment and a detachment of artillery were stationed at this place. Some troops, on their march from Palamcottah to Quilon in January and March 1819, experienced a visitation of the disease. In July and August following, many cases occurred in the 89th regiment, and among the native inhabitants. It was reported to prevail in the northern parts of Travancore nearly at the same periods at which it visited Quilon.

It seems to have reached Trevandrum about the middle of January 1819. Slight cases of cholera had been frequent there in May 1818; and a few had also occurred towards the end of August, and early in September. From this place it gradually extended south to Cape Comorin. Reports of its prevalence at different places in the southern

part of Travancore were made during the first half of 1819; but as the veracity of these depended on natives, no correct estimate of its violence or prevalence can be formed.

The preceding narrative embraces the principal occurrences of cholera during the years 1818, 1819, and 1820, as they affected the soldiery in quarters, and the fixed population of places within the territories of this presidency, or those connected with it. The information regarding bodies of troops under movement, for the greater part of that period, is incomplete.

Epidemic attacks of cholera during the years 1821 and 1822 have happily been very rare amongst the fixed inhabitants, or the troops in quarters. The disease appeared along the coast in the vicinity of Cuddalore in January 1821, and at Royacottah in February; but it did not continue long at these places, and it caused very little mischief.

It appeared in the lines of the 2d regiment Light Cavalry, stationed at Kulladghee in the Dooab, on the 1st of June, and it continued to prevail amongst the men and followers till about the middle of the month. The disease was characterised by rapid depression of the powers of life: the proportionate mortality was great, 28 men having died of 78 who were attacked. There was nothing particular in the state of the weather at the time. It is remarkable, that the disease prevailed at the same period in the village of Bagricottah, about twelve miles distant; while two corps of infantry, the 2d battalion 19th regiment, and the 2d battalion 3d regiment, situated between that village and the lines of the cavalry, and about a mile from the latter, entirely escaped. It subsequently appeared about the beginning of August in one of these corps, the 2d battalion 19th regiment: 21 cases only occurred, of which 6 proved fatal. One man of the 2d battalion 3d regiment was attacked, but it appeared that he resided in the lines of the former corps. In June, the corps at Darwar also

suffered an attack: 28 cases occurred, of which 15 proved fatal.

The disease prevailed to a considerable extent in the district of Canara, in the months of July and August; and the mortality was again very great in proportion to the numbers attacked. The northern parts of that district appear, indeed, to have suffered in an uncommon degree, both from the frequency and the virulence of the attacks of cholera.

It continued to occur, from time to time, at almost every station under this presidency during the year 1821; but the cases were by no means numerous in general, at any one period, nor, with the exceptions already given, and those of marching corps, could it be considered to have assumed the form of an epidemic. The cases were most numerous in the southern division, especially at Salem, Sankerrydroog, and Madura, where fevers were also prevalent.

It appeared at Salem with considerable severity in January 1822. Two cases had previously occurred on the 28th December. It attacked the prisoners in the jail on the 5th of January, of whom 64 were taken ill, and 36 died; it disappeared on the 22d of that month. Between 200 and 300 of the inhabitants of the town are stated to have suffered attacks of the disease, of whom a great number perished. It appeared also, in January, at Samulcottah, first attacking the Sepoys of the 1st battalion, 21st regiment, N. I., and their families; and then the inhabitants of the town. The disease is stated to have commenced immediately after the junction of two considerable detachments—one from Masulipatam, and the other from Chicacole; but it does not appear that any case of it had previously happened in either of these detachments on the march, nor that it existed at the stations whence they had come. The first persons taken ill belonged to Samulcottah, but it is said that they associated much with the new-comers.

The disease appeared in the beginning of March, among the multitude of people assembled at Tutocoreen for the annual pearl-fishery. It is stated that upwards of 100,000 persons were collected on this occasion. Many of these were travellers from distant parts; most of them exceedingly poor, and badly fed; miserably accommodated in temporary huts; exposed to great heat during the day, and to heavy dews at night: the water of the place was brackish, and the opportunities for intemperance numerous, and pretty generally within their reach. The occupation, too, of a considerable proportion of these people, as boatmen, fishermen, and divers, would seem peculiarly to have exposed them to attacks of cholera; yet, notwithstanding all these circumstances, the disease did not gain much ground; not more than 187 people died of it out of that immense multitude, about 443 persons having been attacked. It disappeared in April, with the breaking up of the fishery. The most prominent symptoms observed, in this instance, were an immediate sinking of the circulation; total loss of strength; cold surface; profuse sweat; and collapse of the countenance. Vomiting was neither frequent in occurrence, nor severe when it did occur; spasms of the muscles of voluntary motion were entirely absent; after two or three watery stools, the patient sunk, and death ensued, very generally, in six hours from the commencement of the attack. There appeared to be nothing uncommon in the state of the weather.

Upon the whole, cholera has been less prevalent during the year 1822 than it was in 1821. At many stations, several months have passed consecutively without a single case of it having occurred; and if we except some particular places, and the camps of marching corps, it might be said to have nearly disappeared. The particular places here referred to are Arcot, Wallajahbad, Salem, Sankerrydroog, Trichinopoly, Madura, Calicut; which have continued, since the first appearance of cholera, to exhibit a

greater number of insulated cases than any of the other stations.

In drawing up this narrative of the progress of the epidemic cholera in the peninsula, it has not been found practicable to give a particular account of those attacks which various marching regiments are understood to have experienced, during the years 1818, 1819, and the early part of 1820, as the materials on record in this office respecting them are extremely scanty and defective. During these years, accordingly, the narrative relates almost exclusively to the occurrences of cholera amongst the civil inhabitants, and the soldiery in quarters. Since the middle of the year 1820, the information respecting corps on the march has been tolerably complete; and as the history of the disease, as it affected moving bodies, presents several striking circumstances, it has been purposely reserved for separate recital.

It will be interesting however, in the first place, to state the mortality occasioned by cholera in corps on the march, antecedent to 1820, for the purpose of comparing it with that of succeeding years. Not many instances, indeed, can be given, and in these very little is known of the attendant circumstances. The 2d battalion, 19th regiment, native infantry, marched from Quilon for Bellary, towards the end of January 1819: the route appears to have been by Cochin, Calicut, Tellicherry, the Periah pass, Seringapatam and Serah. Cholera appeared at the commencement of the march, but not with violence, as during all February there were only 49 cases, of which 6 terminated fatally. It continued to occur moderately until the 19th March, when the corps must have been well advanced through Mysore: on that and several succeeding days, it broke out with violence. About 140 cases were admitted in March, of which 44 terminated fatally: the disease ceased in that month. There is no account of the sufferings of the camp-followers.

The 2d battalion 23d regiment, native infantry, on its march from Cannanore to Nagpoor, experienced a most fatal attack of cholera, on the road between Gooty and Hydrabad. The corps had reached the former place in the month of November, without a case of the disease: it began almost immediately after that, and 159 men died of it by the end of the month. It continued but in a greatly mitigated degree in December; 14 men died of it in that month. There is no medical record respecting this corps for the months of November and December 1819, not even the usual sick-returns. It is remarkable that a considerable detachment from Madras, which followed one or two days march in the rear of this corps during the period of its greatest suffering, escaped the disease altogether.

The 1st battalion, 5th regiment, native infantry, marched from Quilon on the 25th November 1819, on its route to Bangalore, by the way of Coimbatoor, and the Guzlehutty pass. Cholera appeared on the first day of the march, but in a mild shape; only 9 cases were admitted from the 25th to the 30th of the month. In the following month it broke out with great severity, but it diminished sensibly, after the corps had ascended the table-land of Mysore, which it did on the 26th December. During that month 180 cases occurred, of which 83 were fatal: in January 1820 the disease ceased.

The 1st battalion, 18th regiment, native infantry, marched from Madras in November 1819, on route to Seringapatam; a few cases of cholera occurred while the corps was below the Ghauts. They ascended the table-land of Mysore on or about the 20th, after which it became much more frequent. It continued till December, but had finally ceased by the end of that month; 74 cases were admitted, and 41 of these terminated fatally.

It has been already observed that the information respecting marching corps, prior to the middle of the year

1820, is very incomplete: such, however, as the records afford is here given.

Cholera was pretty frequent, and very fatal, in the 1st battalion 16th regiment, native infantry, on its march from Hydrabad to Gooty, from the 19th until the end of January 1820. At the latter period the corps had reached Gooty, where it halted for three days. The disease declined in the beginning of February, immediately after the corps left Gooty; and it was of rare occurrence during the remainder of the march to Trichinopoly. It was not attended by pain or evident spasms, nor were the evacuations, either by vomiting or dejection, generally frequent; but the vital powers were early depressed, and rapidly exhausted. Of 90 men attacked, 49 died. Sixteen cases of a less severe nature had occurred in December, on the march between Nagpoor and Hydrabad. Fever was frequent, but not severe, in December; and in January and February both fever and diarrhœa were as frequent as cholera, but neither of them in any instance fatal.

The 2d battalion 8th regiment N.I., on its march from Secundrabad to Madras, arrived on the north bank of the river about six miles from Cuddapah on the 16th of May 1820, having been healthy during the march. This river was so full as to be difficultly passable. On the 17th, however, the corps crossed it. During this day several men were attacked with cholera. The cases, though not very numerous, were frequently fatal. On the 18th the march towards Madras was continued. From the 17th until the end of the month, when the disease disappeared, 36 men of the corps were attacked, and of these 20 died. It was estimated that 150 of the camp-followers had perished during the same period. Cholera did not exist in any of the villages or towns through which the corps had passed between Cuddapah and Madras.

A detachment of about 350 Europeans left St Thomas's Mount towards the end of April 1820, and, notwithstand-

ing the exposure to a most violent storm of wind and rain, on the 9th and 10th of May, the men continued very healthy until they reached Cuddapah. On the 18th they encamped near Cuddapah, on the ground which the 2d battalion 8th regiment N.I. had that morning left, and halted there three days. It was the lowest ground near the town; and, when the detachment took possession of it, the bodies of several of those of the 8th regiment, who had died of cholera, still remained unburied. On the 19th one of the men was attacked with cholera, and the disease immediately became pretty frequent, and very fatal. From this time until the 11th of June, 47 were attacked, of whom 22 died. The detachment had continued its march towards Secundrabad.

The 2d battalion 7th regiment N.I. on its march from Palamcottah to Cannanore, during the months of April and May, experienced a severe attack of cholera towards the end of the former month; the disease disappeared before the termination of the march, after having carried off about 90 men of the corps besides camp-followers, who suffered much. The numbers taken ill with cholera in April are not known, but 41 men died in that month; in May 90 cases were admitted, of which 47 died, making the total loss 87 men.

The 1st battalion 17th regiment N.I. commenced its march from Cannanore to Hydrabad in May, by the route of Seringapatam, Serah, and Bellary. The disease made its appearance in the corps in May, and continued to prevail with some severity during June, but ceased altogether in July, before the end of their march. There appears to have been 330 men taken ill, of whom 82 died. The mortality amongst the camp-followers is not known.

The 1st battalion 19th regiment N.I. experienced a very fatal attack of cholera in the Mysore territory, while on its march from Cannanore to Nagpoor, in June 1820. One case occurred on the night of the 14th, at the town Mysore;

thirteen the subsequent evening at Seringapatam; and the disease immediately became general. It continued prevalent till about the end of June, when it suddenly disappeared, nor did it return at any subsequent period of the march. During the latter half of June, of 920 men, 234 were attacked, and 116 of this number died. The corps had continued its march through Mysore, and on the 1st of July had reached Serah.

The 2d battalion 22d regiment N.I. commenced its march from Madras to Bangalore on the 9th of June 1820, and had prosecuted it in a healthy state until the 29th, when it arrived at Colar. Here the cholera unexpectedly appeared, and suddenly became pretty general. The corps left Colar the following day, and was detained at Ooscottah from the 3d to the 26th of July. The disease began to decline on the 4th of July, and after the 6th rarely occurred. After the 16th no case presented itself. Of this corps 138 men were attacked, and of that number 74 died. The disease first appeared among the followers; and it was observed that in the corps it was almost confined to the privates, who were much exposed to the vicissitudes of the weather, and who, from their own improvidence, had not the means of procuring proper sustenance. After advancing a few days' march from Madras, a hot westerly wind prevailed during the day, and a squally shower generally fell in the evening, which cooled the air considerably, and which was succeeded by a calm that continued during the remainder of the night. A little before sunrise the wind again began to blow; and, in consequence of the rain which had fallen the preceding night, the mornings were cool, pleasant, and refreshing. As the day advanced the wind increased, became hot, peculiarly sharp and penetrating, producing debility and relaxation. After ascending the Mysore country, such a reduction of temperature was experienced as, in the mornings and evenings, to render necessary a considerable augmentation of clothing. When the disease

appeared at Colar the air was chilly and damp. That town is overhung on the north-west by large and lofty hills, the tops of which are, in the evenings and mornings, enveloped by thick clouds. It is open to the eastward, but closely surrounded by large tanks, rice fields, and so much wood, that room could with difficulty be found for the encampment of a regiment. Slight attacks of fever and diarrhœa were the most frequent diseases, previously to the commencement of cholera.

The 1st battalion 7th regiment N.I. marched from Jalnah on the 15th June, by the route of Hydrabad, Bellary, and Chittledroog, to Mangalore, where it arrived on the 4th of November. The weather during the march to Hydrabad was very rainy and boisterous, and the ground of encampment generally wet: about 60 cases of cholera occurred, of which 18 terminated fatally. The corps, having halted nearly a month at Hydrabad, resumed its march on the 13th August; but, although the weather was still inclement, they experienced no further attack of the disease. The medical officer observed, nevertheless, that it existed in the villages on their route, which was the same for the greater part of the distance as that he had followed shortly before, with the 1st battalion 17th regiment, which had suffered so heavily. He imputed the present exemption to their not moving off the ground until the sun was fairly up; to the men being thus enabled to take some warm food before setting out; and to their being taught to examine their evacuations, and to apply for medicine whenever these appeared unusually white—this officer and some others having conceived that cholera was always preceded by a suppression of the secretion or excretion of bile.

The 1st battalion 20th regiment N. I. marched on the 8th of July from Secundrabad, by Gooty, Ooscottah, and Salem, to Palamcottah, where they arrived in the beginning of November. This corps commenced its march while cholera existed in it; but although the disease continued

occasionally to appear, from twenty to thirty men being affected by it during the march, it was generally mild, and only one case proved fatal. Other corps travelling by the same route will be seen to have suffered most severely.

The 1st battalion 22d regiment N.I. marched from Hydrabad on the 2d of August, and arrived at Masulipatam on the 1st September. The weather was extremely rainy, and the ground wet. Cholera appeared shortly after they marched, and continued till the 24th, when it ceased; the weather at the same time became settled: 69 cases occurred, and 19 of these ended unfavourably.

The 2d battalion 21st regiment N.I. experienced a slight attack of cholera on the march from Masulipatam, which it left on the 4th September, to Madras, where it arrived on the 13th of October. During the first part of the march the weather was very rainy, and the ground muddy and wet; but at this period there was no appearance of cholera. The disease afterwards appeared when the air was dry and the sky serene, and when the route lay near the sea shore: 24 cases only took place, of which 3 proved fatal; 70 followers were attacked, and 11 died.

Cholera was very general and fatal in the 2d battalion 20th regiment, native infantry, in October 1820, during part of its march from Samulcottah to Hydrabad. From the 17th until the 21st five cases occurred, and only two during the two following days. It suddenly became general on the 23d, and continued prevalent until the 30th. After the 30th it quickly declined; and before the 6th of November it had almost ceased. Of about 1150 men, 200 were attacked, and 73 died: the amount of the loss of camp-followers, which was said to have been very great, could not be exactly ascertained. On the 21st of October, the corps was at Sheer Mahomedpett; on the 23d continued its march thence towards Mungall; and on the 6th of November arrived at Mulkapoor. Previously to the appearance of cholera the men were very healthy. When cases first

occurred, the weather was cool and cloudy, the wind moderate, and it rained slightly every evening.

The 1st battalion 1st regiment, native infantry, suffered a severe attack of cholera in December 1820, on the route from Nagpoor to Hydrabad. One case occurred at Hingolee; another at Nandair; and the disease suddenly became frequent on the 9th of December, while the corps was encamped near the small village Erkala, ten miles north of Mudnoor. The ground of encampment was confined, low, but dry, of the kind called "cotton soil," situated at the bottom of some rising grounds near the village, and in the neighbourhood of some stagnant water. The corps left this place the following day, and continued its march until the 21st, when, the disease continuing very prevalent, it was resolved to halt at Peddapoor, a village situated on high, sandy ground, one march north of Ondole. Having remained here until the 25th, without any diminution of the frequency or severity of the disease, the corps again proceeded, and on the 30th arrived at Secundrabad. The disease began to decline on the 27th, and no case occurred after the arrival of the corps at the latter station. Of 1010 men, 167 were attacked, and 64 died. There was nothing remarkable in the state of the weather; very little rain fell; the nights and mornings were cold, and the heat of noon was by no means oppressive. Heavy dews sometimes fell, particularly at Peddapoor. The inhabitants of Erkala, where the corps was first attacked, knew nothing of the disease; nor was it known to have existed anywhere on the route from Nagpoor to Hydrabad for many months previously. The villages were entirely free of it when the corps was in their neighbourhood; and it was not known to have subsequently appeared in any of them. For some time before its commencement in the corps, the men, being unable to procure wholesome food, were constantly using new, unripe grain, called D'hall, as the principal article of their diet. Slight quotidian and diarrhœa were the most

frequent diseases previously to the appearance of cholera; and after it had ceased, the former continued to be the most prevalent complaint. On the 13th of January the corps left Secundrabad for Bellary; but no case of cholera occurred during the march.

During the year 1820 numerous small detachments, both of European and native troops, were put in motion, several of which experienced attacks of cholera, and these were pretty generally observed to occur in certain tracts of the great military roads by which they were marching. Having mentioned the instances in which corps, on the march, suffered from cholera during 1820, it will be no less interesting to observe that, under circumstances apparently similar, many regiments escaped entirely, or, at least, did not suffer more than others did in quarters.

H. M. 53d regiment performed the march from Trichinopoly to Bellary, where they arrived on the 25th of February 1820, having had but a few cases of cholera, and by which one man only was lost. H. M. 34th regiment marched from Bangalore to Madras, where they arrived in the end of June: two or three cases of the disease occurred, but none ended fatally. H. M. 46th regiment marched from Madras on the 1st of July, and arrived at Bellary on the 10th of August, by the route of Cuddapah and Gooty. The corps continued generally healthy during the march; but having experienced a violent storm on the night of the 15th July at Balpilly, a small village situated in a deep and extensive jungle, six men were seized with cholera next day, of whom two died: about five or six of the followers also suffered attacks of the disease, after which no farther cases occurred. The left wing of this regiment marched afterwards to Belgaum, where it arrived on the 23d October; and the flank battalion of Europeans marched from that place to Bangalore, where it arrived on the 30th December, without a case of cholera happening in either instance. H. M. 53d regiment marched again from Bel-

lary on the 12th July, and arrived at Bangalore on the 1st of August: one case of cholera occurred, which proved fatal.

The 2d regiment light cavalry marched from Jalnah on the 15th of June, along with the 1st battalion 7th regiment, already noticed as having suffered considerably between that station and Hydrabad. This regiment experienced but very little annoyance from cholera, although under the same circumstances of exposure as the battalion of infantry; and it prosecuted the remainder of the march, from Secundrabad to Kulladghee in the Dooab, without any case of the disease.

The 1st battalion, 21st regiment, native infantry, marched from Secundrabad on the 12th August, and arrived at Samulcottah on the 21st September: a very few insulated cases of cholera occurred; yet this corps traversed the same route as the 1st battalion 22d regiment for the first 150 miles, and only ten days later. The 2d battalion, 9th regiment, native infantry, marched from Belgaum on the 14th September towards Sattarah; thence retrograded, and pursued its march to Nundidroog, where it arrived on the 28th December, without having a case of cholera; nor was the disease observed in any of the villages on the route. The 2d battalion, 2d regiment, native infantry, marched from Bangalore on the 16th September, and arrived at Darwar on the 23d October, pretty nearly in the same track, and had only one case of cholera in a sepoy, who died, and one in a camp-follower, who recovered. The 1st regiment light cavalry marched from Kulladghee by the route of Beejapoor, Pundapoor, and Perinda, on the 15th October, towards Jalnah, where it arrived on the 17th November, without having a single case of the disease. The 1st battalion, 10th regiment, native infantry, marched from Sattarah to Bellary during the months of November and December, also without having a case of it: the 5th regiment, light cavalry, likewise accomplished the march from Jal-

nah to Sholapoor, during the month of November, without a case of the disease. This closes the narrative for the year 1820.

Towards the end of February 1821, the 1st battalion 8th regiment, native infantry, commenced its march from Chittledroog to Nagpoor, and on the 5th of April arrived at Secundrabad. The corps had hitherto been healthy. On the 6th, while encamped here on low, sandy ground, near a tank, two cases of cholera occurred. No one was attacked on the 7th; but on the 8th eleven cases presented themselves. The encampment was this evening removed to higher ground: the disease, however, continued pretty frequent until the 14th, when the corps left Secundrabad. After the 16th only one case occurred. This station was at that time free from the disease. The weather was exceedingly hot, the thermometer being, during the day, about 115° in the double-poled tents of the privates. After enjoying an entire immunity for three weeks, a few were again attacked during the last ten days of the march. The whole number attacked was 58, of which 31 died. The corps reached Nagpoor on the 18th of May.

The 2d battalion 1st regiment, native infantry, commenced its march from Nagpoor to Trichinopoly on the 6th of February 1821, and on the 11th of March arrived at Secundrabad. Fever had been pretty frequent during the early part of the march, but it had now abated very much; and, the other diseases being trifling and local, the corps was considered healthy. While encamped at this place, in a small recess among low hills, near a tank, where the 1st battalion 8th regiment above mentioned had also been encamped, the first case of cholera appeared on the 19th of March, and it soon proved fatal; another fatal case occurred on the following day. The corps proceeded on its march on the 21st, and on the 31st encamped within six miles of the north bank of the river Kistnah. During this interval, cases of cholera occasionally occurred; and diarrhœa, which

had sometimes appeared previously, was pretty frequent. On the 1st of April the battalion crossed the river, and encamped on sloping ground of a black soil near the village Khatoor. Immediately after crossing the river, many of the followers were attacked with cholera; and in a few hours it became frequent and violent in the corps. On the following day the camp was removed to Byeapoor, and pitched on high ground, of a clean, red soil. The cases were not quite so numerous, though equally severe as in the preceding day. The corps crossed the river Toomboodra on the 3d, and encamped on high ground at Kurnool, where it remained until the 6th. On the latter day it proceeded slowly on its route, and on the 15th arrived at Gooty Anantapoor. Here it remained encamped on sandy, open, elevated ground, until the cessation of the disease. From the 2d to the 8th, the disease continued at its height; but from the 8th to the 15th it declined slowly, but progressively. On the 15th it again became very frequent, though not quite so violent as formerly; and until the 25th it continued to prevail, without any considerable remission. After this period few severe cases occurred, but the disease did not altogether disappear until the 17th of May. Of about 940 men, 283 were attacked, and 87 died. Diarrhœa became frequent as cholera declined, and continued so doing the greater part of May. The weather is said to have been generally good: the sky clear, the days hot, and the nights cool. On the nights of the 19th and 20th of April there was a thunder-storm, accompanied with gusts of wind from the north-east, and a shower of rain; and on both days the number of attacks was greater than it had been for a considerable time preceding. Many of the inhabitants in the vicinity of the camp at Gooty were attacked by the disease. The corps left Gooty on the 19th of May, and continued free of the cholera on the route to Trichinopoly.

The 1st battalion 13th regiment, native infantry, left Trichinopoly for Gooty on the 5th of February, and arrived

at the latter place on the 13th May. A few cases of cholera appeared during February, which were mild; but in the neighbourhood of Salem it assumed a more formidable shape, and prevailed during the greater part of March; in April only one case occurred, which was the last on the march. There were 58 admissions in all, and of these 8 died.

The 1st battalion 5th regiment, native infantry, left Bangalore in March 1821, and continued remarkably healthy on its route to Malligaum, in Candeish, until it arrived at Rajoory, between Punderpoor and Ahmednuggur. While encamped at that place on the 14th of May, cholera suddenly commenced in a violent degree, and it continued frequent until the 21st. After this period, its violence and frequency were much diminished; but it did not disappear until early in June, a few days after the arrival of the corps at Malligaum. Of 95 attacked, 47 died. Soon after the arrival of this corps, 16 men of a corps at the station experienced an attack of cholera.

About the middle of March 1821, the 1st battalion 15th regiment, native infantry, left Quilon for Hydrabad, its route being by Coimbatoor, Bangalore, and Gooty. It continued healthy on its way through Mysore. On the 21st of May, when encamped near Koodore, a little beyond the northern boundary of Mysore, cholera suddenly became very frequent. Four cases had previously occurred at long intervals. It began to decline on the 27th, and after the 4th of June, only four cases appeared. Of about 1090 men, 193 were attacked, and 73 died. For some time previous to the 21st of May, the days were very hot, and the nights cold and damp, the thermometer during the former period being at 98° or 100°, and during the latter, from 74° to 76°. The corps had continued to make short marches until the 30th, when it reached Hundee Anantapoor. At this place the sick were comfortably accommodated, and recovered rapidly. No case of cholera occurred

on the route hence to Hyderabad. Diarrhœa and quotidian were the most frequent diseases for some time before the commencement of the attack of cholera, and dysentery was unusually frequent for some time after its cessation. Very soon after the passage of the corps, cholera appeared in almost every village on that part of the route which the corps had travelled while suffering from that disease. In some villages it was very prevalent and destructive. It had not previously existed in any of these villages, nor did it subsequently extend to other parts of the district.

The first battalion 12th regiment, native infantry, marched from Jalnah on the 16th March for Wallajahbad, where it arrived on the 29th May. The route was by Hyderabad, Rachore, Gooty, Cuddapah, and Naggery. This corps experienced no attack of cholera until after it had passed Gooty, early in May, when the disease appeared, and affected 65 men, of whom 21 died; it had nearly disappeared when the corps entered Wallajahbad, and only two or three cases occurred after that.

The 2d battalion 16th regiment, native infantry, experienced a severe attack of cholera on its route from Gooty to Secunderabad. The disease began to appear among the men on the 27th April, three days after they had left Gooty, and continued until the 21st May, within three days' march of Secunderabad. Of 122 attacked, 34 died. This was the third time that cholera had prevailed in the corps.

Early in April 1821, the 1st battalion 4th regiment, native infantry, left Berhampore, near Ganjam, on its route to Nagpoor, by Hyderabad: during April and May a case of cholera occasionally occurred; but the disease did not become frequent until the 2d of June, when the corps was encamped on dry, elevated ground at Juggapet near Mungall. It continued to increase until the 8th, and began to decline on the 10th. After the 15th, on which day the corps arrived at Opal, it was of rare occurrence; and about

the 24th it altogether ceased. During its prevalence the corps was marching through a sterile, parched country, the greater part of it jungly; and the weather was exceedingly hot, the thermometer during the day being from 107° to 113° in the coolest tents of the officers, and in the night seldom sinking under 97°. From the 4th to the 13th provisions were very scarce, and to be procured only after much search under the influence of a burning sun. Some rain fell on the 9th and 11th, which cooled the air considerably; after the 13th, when the corps arrived at Mulkapoor, the sick were well accommodated, and the provisions were more abundant. Of about 1000 men, 170 were attacked, and 57 died. The corps left Hyderabad on the 2d of July; and, notwithstanding the disadvantage of travelling during the rainy season, it continued healthy all the way to Nagpoor.

The 6th regiment of native cavalry commenced its march from Nagpoor to Arcot on the 13th of May, in a healthy state. On the 19th, at Koomlie, two men were attacked by cholera; and from this time until the arrival of the corps at Arcot, about the end of July, the disease, though not at any time very frequent, occasionally occurred. It was most frequent the week before the regiment had reached Hyderabad, and the week following. From Nellore to Arcot it was less frequent than at any former period of the march. No cases in general appeared on the halting days, nor was any one attacked during four days occupied in swimming the Kistnah. Of 122 attacked, 29 died. The weather in May was exceedingly hot and dry. Near the Kistnah, about the end of June, it was cooler and rainy. The disease was not known to exist anywhere on the route.

On the 17th of May, the 1st battalion 11th regiment, native infantry, proceeded from Nagpoor on its route to Ellore, by Hyderabad. Cholera appeared in camp at Barodah on the 24th, became prevalent on the 28th, and

began to decline on the 3d of June. After the 6th, the disease was rare; but cases appeared at considerable intervals during the remainder of the march. Of 138 attacked, 55 died. It was reported by the inhabitants of Idulabad, a town which the corps passed on the 30th of May, that the disease had lately been prevalent there, but had then almost disappeared. The symptoms were most violent during the first four days, when the cases were not very frequent.

On the 21st of May, the 1st battalion 3d regiment, N.I., left Nagpoor for Wallajahbad, by Hyderabad and Nellore. On the 31st, cholera appeared in the camp at Kyer, and continued pretty frequent during June. Cases occasionally occurred till the 27th of July, the corps being at that time three or four days' march south of the river Kistnah. Of 143 attacked, 32 died. The reports contain no observations on the state of the weather or the features of the disease.

The 2d extra battalion marched from Trichinopoly on the 2d June, by Madura and Palamcottah for Quilon, where it arrived on the 11th July; towards the conclusion of the march, and after entering the confines of Travancore, about 17 cases of cholera occurred, of which 6 proved fatal.

The second battalion 24th regiment, N.I., marched from Wallajahbad on the 5th June, by the way of Chittoor, Punganore, and Palsamoodrum, and reached Bellary on the 13th of July. The weather was stated to have been "delightful." Cholera, however, made its appearance about the commencement of the march, and continued at intervals till its conclusion: 62 cases occurred of which 22 terminated fatally.

The 1st battalion 2d regiment, N.I., marched from Malligaum, in Candeish, early in June, by the route of Poonah, Sattarah, Beejapoor, and Bellary, for Bangalore, where it arrived on the 17th October; the greater part of this long

march was prosecuted during the south-west monsoon; 74 cases of cholera occurred, of which 35 proved fatal. The reports are not complete for the early part of the march, and it is not known under what circumstances the disease first appeared; but of the numbers mentioned above, 20 cases occurred, of which 13 were fatal, between Punderpoor and Bejapoor, in which track the disease was raging at the time.

The 1st battalion 16th regiment, N.I., left Trichinopoly in December, by the route of Palamcottah and Madura, for Quilon, where it arrived on the 22d January 1822. About the confines of the Travancore country, cholera appeared in the camp; 17 men were taken ill, of whom 6 died. Nearly at the same time, and on the same route, a large detachment of natives, from Quilon to Trichinopoly, had no case of the disease until they approached Palamcottah.

While corps under movement, at whatever season of the year, and in whatever tract of country, would thus seem obnoxious to severe visitations of cholera, many instances can be adduced of their enjoying an immunity from the disease, under circumstances to all appearance similar.

The 2d battalion 20th regiment, N.I., marched from Hyderabad on the 3d January 1821, by the route of Neermull, and arrived at Nagpoor on the 2d February, without having a single case of cholera. The 5th extra battalion moved from Bangalore to Ryacottah in January; and the 2d battalion 14th regiment, N.I., from Vellore to Chittledoorg in the course of January and February, with an equal exemption; and the 8th regiment light cavalry marched from Sholapoor to Arcot, where it arrived in February, also without any case of the disease. The 2d battalion 12th regiment, N.I., marched from Bellary on the 29th January, by Adonie and Koolburga, for Jalnah, where it arrived on 14th March, and no case of cholera occurred.

The 1st battalion 24th regiment, N.I., moved from Ellore on the 4th February, by Vizianagram and Chicacole, and

reached Berhampore on the 18th March, also without a case of the disease. The medical officer reported, that it had not been known in the villages in this route for two years before. The 3d regiment light cavalry marched from Arcot on the 12th February for Nagpoor, by the route of Cuddapah, Gooty, Hyderabad, and Neermull. Some cases of cholera took place among the camp-followers, of whom five died; but no man of the regiment suffered. The 2d battalion 25th regiment moved from Palamcottah on the 25th February, by the route of Oodagherry and Trivanderum for Quilon, where it arrived on the 13th March: 8 men of this corps were seized with the disease, and two of them died.

The 2d battalion 13th regiment, N.I., marched from Hyderabad on the 13th May, by Ongole, Nellore, and Poonamallee, and arrived at Trichinopoly on the 7th August. Cholera existed in the corps before the commencement of the march, though in a slight degree; two mild cases occurred in the course of the first week, but no other was observed during the remainder of the march. The 2d battalion 6th regiment, N.I., left Hyderabad on the 7th August for Vellore, by nearly the same route of Ongole and Nellore, and reached their destination without having a case of the disease. The 2d battalion 15th regiment, N. I., accomplished the march from Malligaum in Candeish, to Masulipatam, without experiencing a case of cholera; the corps marched on the 13th December 1821, by the route of Jalnah and Secunderabad, and arrived on the 20th February 1822.

Of the numerous detachments moving in the course of the year 1821, many entirely escaped cholera, while most of those marching in particular tracks suffered from it; these tracks were between Nellore, or rather Ongole and Hyderabad; the Cuddapah road towards Bellary and Hyderabad; the route to the northward of Trichinopoly, and between that town and Quilon.

Although many corps of native troops have been under movement during the year 1822, they have enjoyed an almost entire exemption from cholera. The European corps have not been equally fortunate, with two exceptions: first, of the Madras European regiment, which marched from Nagpoor on the 17th January, and arrived at Masulipatam on the 16th of March. At that season of the year, the vicissitudes from cold at night to heat in the day-time, were necessarily sudden and considerable; the route pursued by Chandah, Chinnoor, and Ellore, lay through some very extensive tracks of jungles; yet, notwithstanding these circumstances, only two slight cases of cholera occurred: secondly, of the 2d troop of horse artillery, which effected the march from Nagpoor to Secunderabad, in January and February, without a case of cholera; and again, that to the Mount in September, October, and November, and experiencing almost continued rains and sultry weather, with only one case of cholera in a soldier, and two or three from the fatigue cases among the followers.

This portion of the narrative has been hitherto confined to the notice of marching corps: it is now necessary to advert to some very fatal visitations of cholera, which took place at and near Madras, in the months of May, June, and July, in four of his majesty's regiments: some of these regiments were not, indeed, actually on the march, but they were placed in circumstances differing very little from the fatigue and exposure of a camp life.

His majesty's 54th regiment landed at Madras on the 10th of May, from the H. C. ships William Fairlie and Thomas Coutts, in a remarkably healthy state, after a voyage of 48 days from the Cape of Good Hope, and marched into quarters in Fort St George. Cholera appeared amongst the men within three days after their landing; and it continued till the 7th of June, three days after their moving into camp on their route to Bangalore. It reappeared on the 13th June, but in a greatly mitigated degree.

and did not finally cease till the 1st of July, two days after the regiment marched into quarters at Bangalore; on the 26th of June four cases occurred, but there were no more until the 30th, when there was one case which proved to be the last. Of 632 men, 159 were seized with cholera, of whom 54 died. The European women and children of the regiment suffered considerably, while very few of the native camp-followers were attacked by the disease.

His majesty's 34th regiment moved out of Fort St George on the 10th of May, into camp at the Mount, where they remained stationary till the 25th; on that day the corps commenced its march to Wallajahbad, which it completed in three days, and went into quarters there on the 27th. Cholera appeared in the camp on the 14th, and prevailed with great severity till the 25th; on that day, being the first of their movement, 9 cases occurred, all very tractable. It then ceased; but on the 1st and 2d of June, and on the 19th and 20th of that month, several fresh cases took place: of 836 men, 87 were seized with the disease, of whom 18 died. The regiment was volunteering during greater part of the time they lay at the Mount, an occasion which invariably gives rise to excessive drinking, and, consequently, to great exposure to the climate, whether during the day or night; but the disease had distinctly broken out before the volunteering began. It will likewise be presently seen that another regiment got through their volunteering, and in a standing camp likewise, without any appearance of cholera. The women and children of the 34th regiment suffered considerably, but it does not appear that many of the native camp-followers were attacked.

His majesty's 53d regiment marched from Bangalore towards Madras, on the 11th of May, by the route of Chittoor. The corps was in a remarkably healthy state, neither leaving a man behind, nor having a man in sick carriage. They reached Palamanair, at the top of the Ghauts, on the 20th of May, without accident; but during that and the

succeeding day, two cases of cholera occurred. On the 22d they descended the Ghauts, and the disease gradually increased. The admissions were most numerous from the 27th to the 31st of May, and the disease had ceased by the 5th of June, on which day the regiment marched into Fort St George: of 871 men, 70 were attacked with cholera, of whom 20 died. The native camp-followers suffered comparatively little. This regiment having afterwards moved into camp near Madras, about the middle of July, for the purpose of volunteering into other corps, they, contrary to the experience of the 34th regiment, entirely escaped cholera on that occasion.

His majesty's 41st regiment arrived in two divisions from England on the 6th and 15th of July, and marched into Fort St George. The men of the first division were almost immediately attacked with cholera; those of the second division having landed during its prevalence, several of them were taken ill in the course of the morning of their landing; of 714 men, 159 suffered an attack of the disease, of whom 32 died. The disease had almost entirely ceased by the end of the month.

It has been stated that the 54th regiment landed from the ships William Fairlie and Thomas Coutts, on the 10th of May. In the former ship, while at anchor in the roads, cholera made its appearance on or about the 18th of May: they had 65 cases, and of these 12 proved fatal. The disease did not appear in the Coutts till a fortnight afterwards: they had only 23 cases, of which 6 were fatal. Several circumstances connected with the appearance of the disease on board these ships deserve to be noticed. No case of cholera occurred in either ship while out at sea. The Fairlie lay at anchor so far to the southward, as to be directly to *leeward* of the fort, and this was during the prevalence of the strong south-west winds: the disease was at that period established in the 54th regiment, in garrison there. The men who worked upon deck, and those who slept on

the *landward* side of the ship, were found to be decidedly the most obnoxious to attacks of cholera. The ship afterwards took up a position farther north, and about a quarter of a mile directly to windward of the Coutts: although cholera had then existed in the former ship for nearly a fortnight, one solitary case only had as yet appeared on board the latter ship; this case was in a sailor who slept on deck in a state of intoxication during the night. Thus situated, the wind blew directly over the Fairlie to the Coutts, and the disease at this juncture appeared in the Coutts: all the men attacked, with one exception, slept on the side of the ship next to the Fairlie; this side, however, was likewise the *landward* side. Four men in one mess, on board the Fairlie, died of cholera, the one having been successively nurse to the other.

The comparative liability to cholera, and the comparative mortality under its influence, between old and newly-arrived regiments, as exhibited in the instances above mentioned, may be thus stated:—The 34th regiment had $10\frac{1}{2}$ per cent of their effective strength taken ill, and the 53d regiment had not quite 9 per cent; the 54th regiment had $23\frac{1}{2}$ per cent of their effective strength taken ill, and the 41st regiment a little more than 22 per cent. The 34th regiment lost every fifth man taken ill, and the 53d lost about every three and a-half; the 54th regiment lost every third man taken ill, and the 41st regiment lost every fifth. The four regiments, however, were not placed in parallel circumstances; for the 34th and 53d regiments were under canvass, and one of them was actually marching,—while the 41st and 54th regiments were in quarters, the former during the whole period, and the latter during the greater part of it. Whatever difference there may be with respect to the liability to cholera while a corps is marching or while it is at rest, it is obvious, at least, that a patient labouring under the disease must enjoy many advantages in a fixed hospital which he could not have in a camp, and

that the fatigue of a march, with its attendant interruption of curative means, must be taken into account.

During these months of May, June, and July, while cholera prevailed to so great an extent in the four regiments and on shipboard, if not altogether unknown amongst the other European and native troops at the Presidency, St Thomas' Mount, and Poonamallee, and amongst the European and native population of these places, it was, at least, of as rare occurrence as at any former period since its first invasion. As the season of 1822 was generally considered to have been one of unusual heat at Madras, and to have been distinguished by an uncommon prevalence of hazy weather and south-west winds, this may be the most proper place for some observations on the subject.

In May 1822 there were 16 days with a clear sky; 9 alternately clear and cloudy; and 6 days cloudy and hazy. The mean height of the barometer in May was 29.90, and that of the thermometer was 92° 25; the extreme height of the thermometer was 101°, and its least height 83° 5; rain fell in showers on the 25th and 26th, and again on the 30th. The wind was westerly, and varying from N.W. to S.W. 14 days. The first 12 days of the month were clear, with S.E. wind; the 13th day was clear and hazy, with calms and S.E. wind; the 14th was hazy, the wind W.S.W.; hazy weather prevailed from that time till the 20th, when the sky became clear, and continued generally clear till the 30th. The greatest heats occurred after the 19th; on that day the thermometer stood at 99°, and on the 24th at 101°. The moon was most distant from the earth on the 6th, and nearest to it on the 20th; full moon took place on the 6th, and new moon on the 21st.

The mean number of clear days in the month of May, from 1815 to 1819, was 21, and clear and hazy days 4; making 25 during the month, as in 1822. In 1820, May presented 14 clear, and 8 clear and hazy days, making 22; and in 1821, 15 clear, and 9 clear and hazy days, making

24. In this respect, accordingly, there was nothing unusual in May 1822.

The mean height of the barometer in May, from 1815 to 1819, was 29.88; in 1820, 29.38, in which month a great storm took place; in 1821, it was 29.90. The mean height of the thermometer in May, from 1815 to 1819, was 90° 55; in 1820, it was 86° 1; and in 1821, 89° 5. The mean greatest heat, from 1815 to 1819, was 101° 4; in 1820, the greatest heat was 98° 2; and in 1821 it was 96° 5. In respect to the barometrical phenomena, therefore, the month of May 1822 was not distinguished by any material deviation from former years; but in respect to the thermometrical phenomena, the mean height was 1° 7 above that of the five years from 1815 to 1819; 6° 24 above that of 1820; and 3° 20 above that of 1821. The extreme height in May 1822, viz. 101, was, however, nothing very uncommon; in 1815 it was 104° 50: in 1816, 100° 70; in 1817, 98° 50; in 1818, 103° 80; in 1819, 97° 70; in 1820, 98° 2; and in 1821, 96° 5.

During the last eight years, the quantity of rain which has fallen at Madras in May, has been too inconsiderable to be measured by the rain-gauge—excepting in 1816, when 2–10ths of an inch fell, and in 1820, on occasion of the storm.

With respect to the winds which prevail in May, they blow chiefly from the south-east. When blowing from the land, it does not appear distinctly from the meteorological tables until 1820, whether the quarter was due west, or to the southward of west; but as these winds form what is called the south-west monsoon, it is fair to conclude that their direction is not different now from what it was in former years. In May 1815 there were 21 days with westerly or "land" wind; in 1816 there were 15 days; in 1817, however, there does not appear to have been one day of westerly wind; in 1818 there were also none; in 1819 there were only 3 days of westerly wind; in 1820

there were 15 days of westerly and south-west wind; in 1821, only 4 days; and in 1822, 14 days, which are noted in the tables as south-west. A remarkable deviation would seem, therefore, to have taken place in respect to the winds in the month of May at Madras, in the years 1817 and 1818, which were the first years of the epidemic in India, although it did not reach Madras till October of the latter year. In 1819 a partial re-establishment of the usual westerly wind took place; in 1820 there was a nearer approach towards it; but in 1821 a repetition of the former irregularity; in 1822, however, the usual, or nearly the usual number of days with westerly winds was observed. The month of May has been thus particularly noticed, as during its course the most formidable attacks of cholera yet experienced on this establishment, took place in three European regiments, and in two of the Company's ships noticed above; while the other troops, and the surrounding inhabitants, entirely escaped. As June and July were likewise distinguished by the prevalence of cholera amongst the newly arrived troops, a short retrospect shall be given of the meteorological phenomena of these months also.

At Madras the weather in June is usually cloudy, with occasional showers; and it is cooler than in May. In 1822, June presented only 4 days of clear sky, 4 of clear and hazy, and 22 of cloudy and hazy. The mean height of the barometer was 29·86, and that of the thermometer 87·9; the wind blew from the westward 22 days—1·525 inch of rain fell. The mean number of clear days in June, from 1815 to 1819, was 5; of clear and hazy also 5; and of cloudy and hazy 23. In June 1820 there were 4 clear, 5 clear and hazy, and 21 cloudy and hazy days; but in 1821, in June, there were 19 clear, 3 clear and hazy, and only 8 cloudy and hazy days. The mean height of the barometer in June for 5 years, from 1815 to 1819, was 29·86; in 18·20 it was 29·70; and in 1821, 29·93. The mean height of the thermometer in June, for the same

periods, was 89° 19, 83° 3, and 91° 6. In respect, therefore, of the barometrical and thermometrical phenomena, the month of June 1822 was remarkably regular. The mean quantity of rain, which was measured by gauge in the months of June, from 1815 to 1819, was 0·24; in 1820 it was 0·85; in 1821, 1·1; and in 1822, 1·525. The quantity of rain, therefore, seems to have been greater this year than usual, as it also was in the two preceding years. The mean number of days of westerly wind in June, for 5 years, was 14; but in June of the year 1817 there were only 7 days of west wind, which makes the mean too low; in June 1820 and 1821 there were 26, and 22 days of westerly wind, which agrees nearly with the same month in 1822.

The weather in July at Madras is pretty similar to that of June, and in the year 1822 it presented nothing very unusual. The number of clear days was 10; of clear and hazy, 1; of cloudy and hazy, 20. The mean height of the barometer was 29·90, and that of the thermometer 85° 75. The wind blew from the westward 19 days; 0·55 rain fell. The mean number of clear days in July, from 1815 to 1819, was 4; of clear and hazy, 3, and of cloudy and hazy, 23. In July 1820 there were 2 clear days, 5 clear and hazy, and 24 cloudy and hazy; in 1821, July presented 1 clear day, 10 clear and hazy, and 20 cloudy and hazy. The mean height of the barometer in July, from 1815 to 1819, was 29·85, in 1820 it was 29·95, and in 1821, 29·92. The mean height of the thermometer for the same periods was 86° 36, 87° 4, 88°, 85° 75. The mean number of days in which the wind blew from the westward in July, from 1815 to 1819, was 15; in 1820 it was 22; in 1821 it was 18. In these respects, therefore, the month of July 1822 was remarkably regular. In regard to the fall of rain in July, however, considerable irregularity seems to have prevailed; the mean of five years from 1815 to 1819, in the month of July, was 5·73; but the fall in July 1818 was 12·75, ex-

ceeding all former examples almost; the average of 4 years, *excluding* 1818, gives 3.22; in 1820 the fall of rain in July was 3.525; in 1821 it was 1.20; and in 1822, only 0.55, as above stated.

The mean heights of the barometer and thermometer during the three hot months, May, June, and July, from 1815 to 1822, were as follows:—

1815	Barometer	29.82	Thermometer	87°
1816	,,	29.84	,,	88°
1817	,,	29.91	,,	88°
1818	,,	29.87	,,	88°
1819	,,	29.86	,,	89°
1820	,,	29.74	,,	87°
1821	,,	29.92	,,	89°
1822	,,	29.89	,,	88°

Were they to judge by their bodily feelings, most persons who resided at Madras during May 1822, would be disposed to affirm that the heat in that month was intense; the atmosphere oppressive and lowering in an unusual degree; the sky gloomy, and the winds most distressing and enervating, combining much of the relaxing property of what are termed "long-shore winds," with the heat of the "land winds." It is certain that the salubrity of an atmosphere cannot be determined by philosophical instruments, any more than by our feelings; and that even our perceptions of its sensible properties are considerably influenced by the imagination; but this seems the proper place to admit, that the weather at the Presidency, during the period in question, was not, to our sensations, that which it was indicated by instruments and meteorological records to be, viz., a season in most respects regular. The epidemic has arisen, and has prevailed during every state of the weather; its appearances at stations, and in corps, during cool, and during hot weather, are very nearly equal in point of number; but they have been doubly more frequent in *dry* than in *wet* weather.

A very considerable number of small parties of European troops have been put in motion from one station to another during the year 1822; these, although generally escaping any formidable attacks of cholera, have nevertheless exhibited a greater proportional number of sporadic cases of the disease than parties of native troops who have been marching nearly by the same routes, and at the same seasons of the year. Some of these European detachments have suffered pretty severely. In one which proceeded from Poonamallee to Trichinopoly in January, the disease appeared at Olundurpett: they had 11 cases, of which 7 terminated fatally; another, proceeding from Poonamallee to Secunderabad, had 24 cases, of which 5 terminated unfavourably. This detachment moved from Poonamallee on the 11th April, and on the following day passed through the camp of a detachment of artillery in which cholera had prevailed for some time; on the 14th the disease appeared, but it continued for two or three days only. In the artillery detachment, on the contrary, which had come from Nagpoor, it had hung about them ever since they left the Kistnah, occasionally attacking both Europeans and natives: the disease was not known in the villages on the route, nor in the 1st battalion 9th regiment, native infantry, which was marching the same way, and frequently coming in contact with the artillery.

It has already been observed that the native troops, which have been under movement in the course of this year, have enjoyed an almost total exemption from cholera. The instances shall now be briefly noticed in order to complete this narrative.

The 3d regiment, light cavalry, the 1st battalion, 4th regiment, native infantry, and the 2d battalion 20th regiment, native infantry, moved from Nagpoor about the middle of January, and arrived at Secunderabad towards the end of February, the cavalry by the route of Bassim and Nandair, the infantry by Neermull, and continued free

from cholera. The 1st battalion, 6th regiment, marched at the same period from Nagpoor, and arrived at Bangalore on the 6th April, having travelled by Neermull, Hyderabad, and Gooty, and it likewise escaped cholera; during its passage through the ceded districts, remittent fever was rather prevalent. The 2d battalion, 23d regiment, native infantry, left Nagpoor on the same day with the 6th regiment, and, travelling by the same route, reached Bellary on the 19th March, and continued healthy during the march.

The 1st battalion, 8th regiment, native infantry, left Nagpoor on the 15th January for Jalnah, where it arrived on the 11th February, having suffered no sickness on the march. The 1st battalion, 19th regiment, native infantry, marched from Chandah, in the Nagpoor territory, on the 20th January, by the route of Chinnore and Ellore, and reached Chicacole on the 24th March. The 2d battalion, 5th regiment, native infantry, left Jalnah on the 13th February, and arrived at Cuddapah on the 7th of April, by the route of Beder, Moorindab on the Kistnah, and Nundiall. Intermittent fever became frequent while the corps was marching through an extensive jungle; but no case of cholera occurred. The 1st battalion, 9th regiment, native infantry, marched from Secunderabad on the 25th February, by the route of Ongole and Nellore, and though frequently coming in contact with the artillery detachment from Nagpoor, in which camp cholera was present, the battalion entirely escaped the disease: it arrived at the new cantonment of Palaveram, near the Mount, on the 13th April. The 1st battalion, 22d regiment, native infantry, marched for the same destination on the 26th February, from Masulipatam, and arrived on the 10th of April; the corps was remarkably healthy, but one case of cholera occurred ending fatally. These two corps may be considered to have remained under circumstances almost entirely similar to a standing camp, during the succeeding

hot months of May, June, July, and August, but cholera did not arise amongst them.

The 1st battalion, 17th regiment, native infantry, moved during the month of March from Secundrabad to Masulipatam, without experiencing a case of cholera. The 2d battalion, 4th regiment, native infantry, moved from Darwar on the 21st April, and, marching by Hurryhur and Ossoor, reached Ryacottah on the 24th of May: no case of cholera occurred during the march, but, shortly after the arrival of the corps at its destination, a few men were seized with it. The 2d battalion, pioneers, moved from Neemla Ghaut early in March, by the route of Darwar, Chittledroog, and Nundidroog, to Naickenary, at the top of the Pedanaigdroog pass, where they arrived on the 5th of May, without having experienced any case of cholera. The 7th regiment, light cavalry, marched from Arcot on the 2d September, and arrived at Trichinopoly on the 19th; one case of cholera occurred towards the end of the march, which proved fatal.

The detachments of native troops which were put in motion during the year 1822 experienced as little inconvenience from cholera as the corps which have been noticed. It may be proper to observe, however, that with exception of the 2d battalion, 4th regiment, no native corps was actually marching during the months of May, June, and July, when cholera was so fatally prevalent in the four European regiments; but the two native battalions at Palaveram, in the immediate vicinity of Madras, were during that period, as already noticed, certainly exposed to most of the inconveniences of a standing camp; and it was in standing camps, and in quarters, that three of the four regiments suffered the visitations described.

Epidemic cholera having now existed in these territories for about five years, and, as the preceding narrative evinces, having proved a formidable scourge to all conditions of people, it will be satisfactory here to exhibit that the

extent of its ravages in the army falls short of what might be apprehended from a cursory perusal of its history. The following tabular view is taken from the returns in the appendix; and it will not pass unobserved, that, prior to the appearance of the epidemic, cases of cholera were progressively becoming more frequent.

Tabular view of the number of cases of Cholera occurring in the army of Fort St George, from 1815 *to* 1824.

Years.	Europeans.		Natives.		Strength.		Remarks.
	Admitted.	Dead.	Admitted.	Dead.	Europeans.	Natives.	
1815	65	,,	87	,,	13,409	59,672	
1816	97	,,	92	,,	13,943	61,969	
1817	168	,,	114	,,	12,959	61,641	
1818	1087	232	3,314	664	10,652	58,764	
1819	564	85	3,779	734	10,125	63,782	
1820	356	69	3,322	758	9,416	76,870	
1821	357	39	2,527	830	9,553	82,046	
1822	774	170	548	199	10,813	74,707	
1823	248	50	809	339	11,262	71,389	
1824	80	11	345	139	10,842	68,353	Jan. Feb. & Mr.
From 1818 to 1824	3466	656	14,644	3663			
Contingencies, .	526	100	2,340	550			
Total, . . .	3992	766	16,984	4213			

The general returns for 1815 to 1817 do not exhibit the diseases from which casualties arose, and it is not known, accordingly, whether any, or how many of the cases of cholera during these years terminated in death; but in the course of the first four months of 1818, when 17 cases of cholera took place amongst Europeans, no death ensued; in May, 14 cases occurred, and 9 died. Amongst the natives, during January and February, 10 cases took place without a casualty; in March, 12 cases and 2 deaths; in April, 37 cases and 13 deaths; in May, 72 cases and 24

deaths. We may therefore conclude that the epidemic cholera furnished the first casualties amongst Europeans in May, and amongst the natives in March 1818; and that, prior to that period, the casualties from cholera, commonly called cholera morbus, did not exceed the usual proportions.

From 1818 to1823-4 inclusive, the medical returns show 3466 cases of cholera in Europeans, of which 656 terminated fatally, being in proportion of 19 per centum; and 14,644 cases in natives, of which 3663 terminated fatally, being about 25 per centum. As, however, the medical returns of small detachments of Europeans are not always included in the general returns, and as there are no returns at all from some of these detachments, 526 cases, and their proportional 100 casualties, are allowed to meet the aggregate of such incidents, which then give 3992 cases and 766 deaths. The medical returns of various native troops being missing for certain months, recourse was had to the regimental records, from which it appears that very nearly 550 men have died of cholera without appearing in the tables; which number gives 2340 cases; with these additions the total number of cases in the natives of the army may be stated at 16,984 and the casualties at 4213. This loss will probably fall much within the calculations of those who have been accustomed to hear of the ravages committed by the disease.

Great as the proportionate mortality which has just been stated may appear to be, it is nevertheless probably far within the truth. When the disease first appeared, there were many causes tending to magnify the number of attacks and the number of cures; and a most erroneous estimate was too generally formed of the relations in which these events actually stood to each other: the regimental practitioner was accordingly astonished and dismayed at finding, when the disease attacked his corps, and each case was authenticated under his own observation, that the propor-

tion of deaths was most widely different, and greatly exceeded his calculations.

It is probable, that since cholera has been prevalent, many cases have been ranked under that head in the returns, which at other times, and under a more careful diagnosis, would have found their places in other columns. The "cholera morbus," too, has been necessarily blended in the tables with the "epidemic cholera," for, notwithstanding every precaution, it was found that these forms of disease could not be accurately distinguished in most of the returns: whether, under this uncertainty, that form of the disease has increased in latter years, in the ratio of increase exhibited in 1816 and 1817, or not, it is difficult to judge; but there have at least occurred, on several occasions, a kind of cholera very frequent in its attacks, and in all respects answering the definition of Cullen.

To ascertain, therefore, the true proportional mortality of the prevailing epidemic cholera, recourse may be had to those formidable visitations in particular corps which form part of the subject of the preceding narrative; and the result of this inquiry gives 767 cases and 211 deaths amongst the European troops, and 4065 cases, with 1544 deaths, amongst the natives. We have thus the proportion of $27\frac{1}{2}$ per centum in the former, and nearly 38 in the latter, which, considering that this disease runs its fatal course very generally within twelve hours, sufficiently marks it as one of the most formidable that has ever afflicted the human race.

THE END.